

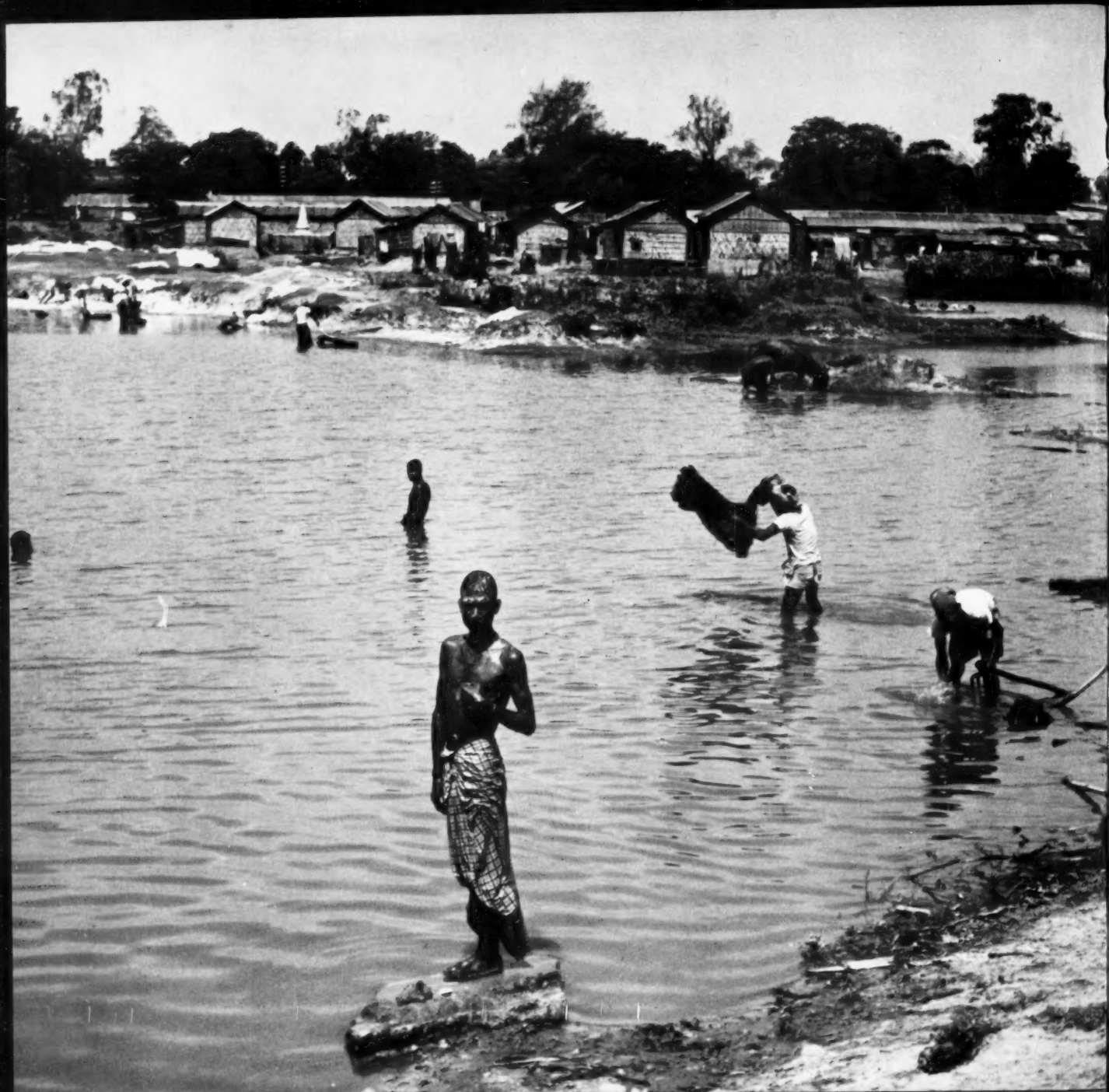
PUBLIC HEALTH REPORTS

In this issue



U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service



PUBLIC HEALTH REPORTS

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frontispiece

Morning at a tank near Dacca, East Pakistan. Men bathe, clean a plough, throw a fishnet. In the background, dhobies wash clothes, man washes a bullock. In the far distance is a row of latrines. (See paper on pages 791-803 on the role of the village tanks in endemic cholera.)

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PUBLIC HEALTH MONOGRAPH No. 63 . . . Academy of Medical Sciences of the USSR, history and organization, 1944-59.

Galina V. Zarechnak

Summary and information on availability appear on page 840.

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MEYER, WILLIAM J. (Bucks County, Pa.): Continuous diabetes screening in a rural area. *Public Health Reports, Vol. 75, September 1960, pp. 784-790.*

Blood samples for screening by a Hewson clinitron are obtained in mobile clinics conducted under a program established in March 1958 in a tricounty rural section of upstate New York (Saratoga, Warren, and Washington Counties). The program's objectives are to provide a casefinding service for one of the serious chronic diseases and, at the same time, to develop practical techniques for use in rural public health practice.

Of the 3,851 persons tested during the first 10 months of operation, 1.3 percent proved to have previously unknown diabetes. This percentage of new cases found is undoubtedly low because of (a) the time interval between the last meal

and the test and (b) the general non-use of postprandial blood testing by private physicians making final diagnoses of screenees with positive tests. This inadequate followup testing poses a problem for which no effective corrective action has as yet been devised.

Cost looms large among the program's unsolved problems, with costs per test performed and per new case found approximately 50 percent higher than those reported for programs in urban areas. However, as program operations expand toward the long-range goal of testing 10 percent of the population over the age of 20, costs will be lowered.

COCKBURN, THOMAS A. (Johns Hopkins University School of Hygiene and Public Health), and CASSANOS, JAMES G.: Epidemiology of endemic cholera. *Public Health Reports, Vol. 75, September 1960, pp. 791-803.*

A theory is presented to explain the long-recognized connection between the incidence of cholera and changing weather conditions in Bengal. The theory is that in hot, dry weather algae in the village water tanks raise the pH of the water so high that the cholera vibrio is favored over other organisms.

The potentialities of these ponds of surface water which serve as the village water supply in spreading infection and the ability of the cholera vibrio to withstand a high pH have been noted.

Results of weekly tests of the pH of six tanks for a 1-year period and observa-

tions of the relationship of the pH to weather and to incidence indicate that the pH is a factor to be taken into account. It is suggested that the tanks are the chief means for spread of the vibrio and that the endemic infection is primarily rural rather than urban.

Cholera is endemic in Bengal, the major remaining focus of infection, because of polluted drinking water. The eradication of cholera from Bengal, and therefore from the world, depends largely on the success of the Pakistani and Indian Governments in replacing the village tanks with a source of safe water.

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FLECK, ANDREW C., HILLEBOE, HERMAN E., and SMITH, GEORGE E., Jr. (New York State Department of Health): *Evaluation of tuberculosis casefinding by mass small film radiography. Public Health Reports, Vol. 75, September 1960, pages 805-813.*

Evaluation of a public health program requires that a predicting system be devised and made a continuing part of the program. The application of such a system to a tuberculosis casefinding program in upstate New York produced the information that yields of cases found by mass X-ray surveys are low and will continue to decline.

No decision could be made on the basis of the dollar value of the mass X-ray screening system without making a simi-

lar study of all other casefinding methods. Adjustments were made within the program on the basis of the associative predictions and upon an unquantitated value system characteristic of the New York State Department of Health.

Less than 10 percent of all new cases of tuberculosis discovered in 1958 were found by the radiographic screening method at an average variable cost of \$1,441 per case found.

PATNO, MARY ELLEN (University of Michigan): *Mortality and economic level in an urban area. Public Health Reports, Vol. 75, September 1960, pp. 841-851.*

Recent studies have suggested that the incidence of illness has become constant among the various economic classes, raising a question as to whether the long-established inverse relationship between mortality and economic level is waning. On the basis of income, home value, and rental, the 1940 and 1950 white populations of Pittsburgh, Pa., were divided into three relative economic groups: low, middle, and high. Analysis of the 1940 and 1950 mortality experiences showed that the differential between males in the low and high groups was as great in 1950 as in 1940. Among females, the differential was less pronounced in 1950.

Areas of the city were cross-classified in terms of the relative economic levels of their populations in the 2 years, and the mortality for both years was studied. The results included an association between the 1940 mortality experience and the "future" relative economic level of the area. In other words, the most favorable experience in 1940 occurred in the areas which were to rise in relative economic level or to remain at the high level. The least favorable experience occurred in the areas which were to fall in level or to remain at the low level. No association was found between the 1950 mortality and the past economic level of areas.

Signs

and

Symptoms

of trends in public health

Household Sanitation

In Birmingham, Ala., the department of health has assigned four employees full time to make personal visits to householders, in an effort to encourage proper disposal of garbage and rubbish, control animal nuisances, and reduce accident hazards. In 1959, 37,621 premise inspections were made for sanitary conditions and 9,603 nuisances were abated which included rats, flies, mosquitoes, and animals. Premises cleaned as a result of these inspections totaled 3,649.

Nuclear Liability Laws

Peaceful uses of atomic energy, as they expand, require significant changes in current legal concepts, according to a study published recently by the University of Michigan.

Entitled "Atoms and the Law," the 1,500-page study summarizes 9 years of work in this field by the University's Law School. The authors are Dean E. Blythe Stason and Profs. Samuel D. Estep and William J. Peirce.

Major changes foreseen include "contingent injury funds" to pay for personal injuries resulting from radiation and other atomic hazards, when their effects are not immediately apparent; legislation to clarify the liabilities involved in various types of atomic activity, balancing the value of technological advances with the hazard involved for society; and revision of workmen's compensation laws to cover atomic cases, including some means of apportioning costs of radiation injuries where more than one employer may be involved.

British Medical Care

Public health has a broad horizon as viewed by Dr. J. L. Burn, health officer of Salford, England, in his "Recent Advances in Public Health," published by Little, Brown. Writing as a physician participating in England's National Health Plan, Dr. Burn's experience extends far beyond the usual concept of public health as a means of containing contagious diseases or assuring safe water supplies. He explains at length his work in rehabilitation, the care of mental defectives, the prevention of mental illness, the maladjusted child, the "delicate child," unmarried parents, problem families, as well as homes for the elderly, the disabled housewife, the prevention of eviction, and chronic bronchitis, lung cancer, immunization procedures, food hygiene, radiation hazards, and fluoridation. The plan provides a home bathing service, a domiciliary foot health service, and a laundry service for incontinent patients in the home.

Health Services Explained

"A Guide for Coordinating Health Instruction and Health Service," issued in Marion County, Ind., is based on the experience of public and parochial school teachers, school administrators, and public health nurses. The plastic-bound booklet presents in illustrated pages a concise delineation of the purpose of each school health program, eligibility requirements, and where responsibility is delegated.

Expressed need prompted the school health committee of the Marion County Tuberculosis Association to sponsor a workshop in

1956 attended by 90 participants for the purpose of developing a clear definition of the responsibilities of the teacher and the nurse in the administration of the various health services and related instruction.

Each workshop participant reviewed and approved the final draft of the guidebook. The foreword emphasizes, however, that this is not an administrative bulletin and does not change or supersede existing policy. Rather, it is a suggested plan for an effective school health program through coordination of instruction and services.

Diabetes Screener

A device for diabetes testing of a few specimens of blood at a time was demonstrated to 125 representatives of local health departments and private physicians by the New Hanover County (N.C.) Health Department in March 1960. The device, called the "clinicutic," sells for \$40 and is described as a modification of the clinitron. The seminar was called to stimulate the interest of public health workers in a more intensive search for diabetes.

Voluntaries Studied

An ad hoc committee to make an exploratory study of the role and responsibilities of voluntary health and welfare agencies in the United States has been formed, the Rockefeller Foundation announces, with Dr. Robert H. Hamlin, associate professor of public health practice, Harvard University School of Public Health, as study director.

Suffer Little Children

Inspection of nurseries and nursery schools by a sanitarian in the Prince Georges County (Md.) Health Department revealed 70 children in the house and yard of a building with an indicated capacity of 42. Against the angry protests of the operator, the sanitarian then looked into the basement and found 20 more children in cramped quarters, inadequately lit, poorly ventilated, and with a single outside exit through a narrow hall. Corrections have been ordered, and the basement quarters closed.

The Future of Alcoholism Programs

I. JAY BRIGHTMAN, M.D.

In the closing paper at the 10th annual meeting of the conference of the North American Association of Alcoholism Programs, held in West Harwich, Mass., September 11, 1959, Dr. Brightman appraised current programs for treating alcoholics and suggested some future trends. Following is a summary of his statement.

A PROGRAM for alcoholism can be no stronger than the total public health, mental health, educational, and welfare programs of the community. No matter how many specialized clinics and hospital services we have, we shall still be dependent upon adequate medical and mental health clinical services in the community to accept, treat, and rehabilitate alcoholics if the total needs are to be met.

The best vocational programs of local alcoholism committees cannot serve the alcoholic as well as an adequately organized public vocational rehabilitation service which evaluates, trains, and places persons with all types of long-term illnesses and disabilities, including alcoholism.

Indeed I question whether we are justified in asking for well-organized alcoholism programs in the absence of adequate public health services. What about a community which is weak in maternal and child health and welfare services, has inadequate tuberculosis control, and lacks an approach to cancer control? Which program should have priority? Recognition of such deficiencies means that a group interested in alcoholism control has a double duty; it must first argue for the development of these more basic services.

Scientists, including Dr. E. M. Jellinek, are

Dr. Brightman is assistant commissioner for chronic disease services, New York State Department of Health, Albany.

working on an improvement of the Jellinek formula for estimating the prevalence of alcoholics in the country, the State, and the community. We can look forward to the development of a more precise instrument to make comparisons, to observe trends, and to place alcoholism in perspective in relation to other public health concerns. However, our most elaborate alcoholism programs now provide for only a handful of the total number of alcoholics known to the courts, the family agencies, the welfare departments, and the waiting lists of the alcoholism clinics themselves.

Planning for Types of Alcoholics

To a great extent, many of our programs were sold on the basis that the alcoholics were crowding our courts and jails and were disgracing our cities with skidrows. It was expected that development of public information centers and clinic services would reduce the court problem. Many clinics have developed, and most of these are taxed to capacity. I don't think many of us would claim that we have yet made a significant dent in the conditions upon which we based our premises. We have recognized that our clinics are serving a different population, the problem drinker whose alcoholism is interfering with his family, industrial, and community life, even though he may still be maintaining ties in these areas.

We must reconsider the alcoholics known to the courts and to the police. We must recognize that in these patients who are mostly homeless and have little or no social background upon which to build, nothing to which they may be rehabilitated, we have a sociological rather than a public health problem.

In New York State we have been interested

in the development of an institution, Camp LaGuardia, at Chester, N.Y., where men are referred from the Municipal Lodging House in New York City. Originally designed to give these men a few weeks stay in the country, the camp is now a 1,000-bed facility with two-thirds of its residents permanent. They have demonstrated that they need sheltered care more than they do alcohol; only about 20 percent violated camp rules and went to the village for alcoholic beverages, not satisfied with the beer purchasable on the premises. By having every man take care of his personal needs and all who are capable perform chores, the camp is run at the cost of \$2 per person per day, or 10 cents less than the cost of operating the Municipal Lodging House.

Specialists may argue that nothing is being done to rehabilitate these unfortunate individuals and that it is not a "modern approach" simply to provide sheltered care. Obviously, a great number of professional services, including social work evaluations and vocational rehabilitation counseling, assuming professional personnel could be recruited, would send the costs of this operation beyond what the taxpayers and the legislators might be willing to meet. The question would arise as to what might be expected from such services. Certainly every attempt should be made to identify those campers who might have potentialities for achieving a better social and economic status in life. But our efforts might better be spent, from the financial and personnel viewpoints, in the rehabilitation of persons suffering with chronic alcoholism who have a more sound social structure upon which to build.

Public and voluntary agencies have made much headway in gaining support for alcoholism programs from certain segments of the population, but there are still many obstacles to reasonable acceptance of the program by the community as a whole.

Why is the public not inclined to support a dynamic program for victims of alcoholism? I think the answer is relatively simple. The public is appalled by the picture of the skidrow alcoholic which, for many persons, is synonymous with alcoholism. This is not the person seen in most of our clinics. Rather it is the problem drinker, with a family and a position

in the industrial community, striving to preserve his ties to society. If the alcoholic himself cannot present a sympathetic picture, then his wife and children may do so, because they will become community responsibilities unless the alcoholic breadwinner is assisted. The cost and danger of alcoholism to the drinker's employer and fellow workers is also a powerful argument for treatment.

Relationships With Other Agencies

To a great extent, alcoholism clinics have operated as isolated units, even when located in health departments, and the cause has suffered seriously from this provincialism.

We cannot possibly handle all the alcoholics through specialized services. While there is a valid basis for continuing to require specialized facilities, particularly in large centers of population, to serve as demonstration projects and to handle special problem cases, most alcoholic patients can be cared for by the general agencies: mental health clinics, family care agencies, general hospitals, vocational rehabilitation services, and many others. Acceptance of alcoholics by the general agencies will result in utilization of their staffs' professional personnel, reduction of the stigma of alcoholism, and better management of individuals and families with a complex of many problems.

To achieve such acceptance, we have two tasks to do. The first is to encourage the general agencies to feel that they can serve the alcoholic patient effectively. The reluctance of the physician, the social worker, or the vocational counselor to provide services for alcoholics is not too surprising. Their experiences have been frustrating and disappointing. But care of the aged was also rejected by many physicians and other professional personnel until demonstrations revealed the achievements possible. Such demonstrations would serve the alcoholics, as well.

Second, we must train the personnel of the general agencies in the management of alcoholism. New York State has been operating a scholarship and training program to send individuals to the Yale Summer School of Alcohol Studies and to other special courses. During the past 3 years, 57 persons have received

such training. Many are with general programs and we are hopeful that this training will increase their services to the alcoholic population.

Evaluation of Results

In evaluating the results of our work, it is essential not to make false claims. These can set us back many years or possibly eliminate our programs entirely. On the other hand, it is equally important to recognize where improvements have occurred. Certainly, we recognize that it is not necessary for alcoholic patients to develop into complete abstainers before they can begin to show improvement. Maintenance of family relationship which has been shaky during the period of frequent drinking, ability to keep a job that was previously threatened, ability to stay out of jail when frequent police pickups have formerly occurred; these are signs of real improvement, even though ideal behavior may not have been attained. Reductions in the frequency and intensity of alcoholic bouts permit the alcoholic to function to some degree and enjoy a more sympathetic environment, which is an important element of therapy.

The halfway house and other specialized services require careful study. It is not sufficient to say so many persons were placed in employment. The question is how long do they stay in employment. Data given out on the general vocational rehabilitation programs use as a criteria a placement of a person in a job for 30 days. But how many persons who can maintain themselves in jobs for 30 days, particularly after a great deal of supportive therapy by vocational counselors and other persons and possibly special consideration by their employers, are still able to hold a job after these special considerations are dropped? As more halfway houses develop, we must begin to develop procedures for following such persons to see how many are working at 3 months,

6 months, and 1 year. We may then determine whether such results are related to our own efforts.

The Future

The North American Association of Alcoholism Programs has grown from a handful of member agencies 9 years ago to our present 36 members. At the same time the number of commissions on alcoholism has declined from 18 to 14, and the number of State department of health alcoholism units has increased from 8 to 14. This is a healthy sign if, as I believe, alcoholism programs can be most effective when closely associated with other public health programs.

The association is fortunate to have had a joint committee with the National Council on Alcoholism. In every area of health, a proper balance of activities between public and voluntary agencies is essential to really effective action. There is not only ample room but definite need for both, and the more one progresses, the easier will be the task for the other.

We have three major goals for the years ahead; evaluation of what we have done, the development of better means of prevention, and the advancement of behavioral, biochemical, and administrative research. The association is sponsoring the development of an evaluation study through a new Coordinating Commission on Alcoholism, which has the potential of gaining confidence for our present activities, or if we are not operating in the proper direction, reshaping them.

Prevention, of course, is the ultimate goal. However, for the present there is no likelihood of prevention of alcoholism as a specific phenomenon. Prevention lies in the promotion of mental health and in assistance to emotionally immature or unstable persons. This course of action may serve to curb not only alcoholism but many other forms of destructive behavior.

ALCOHOLISM IN INDUSTRY

CONFERENCE REPORT. "Modern Approaches to the Problem Drinker in Industry" was the subject of one session at the annual meeting of the National Council on Alcoholism, held in New York City, March 22-25, 1960. Following are summaries of three papers describing these approaches.

New Attitudes

Introducing a session on control of alcoholism in industry, Prof. Harrison Trice of Cornell University reviewed the changes in attitude and understanding of drinking that had emerged in the last 25 years. In the 1930's, he said, objective study was beginning to replace emotional opinions about alcoholism, and diagnosis and treatment were coming to replace moral condemnation, ostracism, or punishment of the drinker. Conventionally, alcoholism is now spoken of more as an illness, he said, than as evidence of degeneracy or a basis of social disgrace.

The arsenal of management, Trice stated, is limited so far to experimental methods which include psychiatry; chemical prescriptions; dietary programs; changes in the physical, social, or working environment; or reconstruction of habit patterns. Evaluation of such efforts so far, he said, needs more attention.

Objective studies by Jellinek, Bacon, Straus, and Henderson, Trice reported, have corrected illusions about the character of the alcoholic personality. Such studies, he said, fail to iden-

tify alcoholism with any special occupation, background, or character. Alcoholics, the investigators found, were in many ways stable, active, and on the job, rather than social rejects. More often than not they are middle-aged, in the early and medium stages of alcoholism, rather than far gone or full blown, in the condition of a desperate lush.

Industry also has changed its attitude, he said, veering away from a resolute blindness, comparable to an earlier attitude toward venereal disease, through a stage when it was considered poor public relations to take a position on the liquor issue, toward a progressive policy of enlightened, scientific management.

As recently as 1955, Trice said, management and labor began jointly to pick up the trail blazed by a few progressive companies, with an increased interest in rehabilitation. By now, more than 100 major companies have formulated policies along such lines, although not all have developed programs of identification, diagnosis, and treatment or rehabilitation.

In part, this change has been simply humanitarian, he said, and in part, a realization of the value to be realized from saving a trained and

experienced employee. It is now accepted that about 3 percent of the working force is alcoholic, although this proportion varies radically from one location to another. Most alcoholics are male, usually in the early stages characterized by blackouts, poor eating habits, lack of control, a sharp drop in efficiency, and, above all, absenteeism.

Absenteeism, he said, is estimated to be the chief cost of alcoholism. Even among those in executive and professional occupations, who tend to report to the office rather than stay home with a hangover, alcoholism exacts an economic toll because the alcoholic executive is in no condition to do a suitable day's work, he added, or to make sound decisions. There is evidence that by staying home alcoholics with heavier physical duties reduce the probability of accidents on the job. For this reason, the accident rate among alcoholics is not as high as formerly assumed.

Another economic cost, immediately shared by their co-workers, results from efforts to shield the alcoholic from detection, to cover up for his failures, with a consequent impairment of responsibility in the non-alcoholic working force.

One Company's Plan

Dr. C. Anthony D'Alonzo, assistant medical director of E. I. du Pont de Nemours & Co., described the simple and relatively inexpensive plan for treating alcoholic employees that the company has evolved over a 16-year period. A recent study of 87,131 employees uncovered 950 alcoholics; 66 percent of these have been rehabilitated, 23 percent have improved but have not fully recovered, and 11 percent are unchanged or their status is uncertain, he said.

Two attitudes, frank recognition of the alcoholic by fellow employees and the concept that alcoholism is a disease, underlie the company's plan, he stated. A full-time employee who is a recovered alcoholic and a member of AA gives talks to plant groups, emphasizing the importance of identifying the problem drinkers among their co-workers.

When an alcoholic is identified, the plant physician, the adviser on alcoholism, or a mem-

Key Characteristic

"Industry on the whole has acquired a key characteristic of the individual problem drinker—the tendency to hide the problem," stated Dr. Selden Bacon, director of the Center of Alcohol Studies, Yale University, at a meeting of the Washington, D.C., Area Council on Alcoholism, held October 21, 1959. He cited a study in a company employing 10,000 persons which "showed problem drinkers drew three times as much in sickness benefits, were absent 2.5 times as often, and had three times as many accidents as other company employees who were matched with the problem drinkers for age, sex, years with the company, job status, and ethnic origins." . . . "Industry is throwing hundreds of thousands of dollars a year down a rat hole by avoiding competent industrial analysis of employee alcoholism," Bacon declared.

ber of AA orients the patient to the firm's attitude that alcoholism is a disease, and he is given every opportunity for rehabilitation. Cooperation with AA has given by far the best results, declared D'Alonzo, and when psychiatrists work closely with this organization, the results are further enhanced.

The amount of time given an employee to recover and whether or not he receives leave from work depend on his age, years of service, previous opportunities, nearness to retirement age, temporary or permanent complications of the disease, and the employee's attitude and sincerity. Often no leave from work is desirable; experience has taught us that alcoholics do better with surveillance on the job, D'Alonzo declared. In the absence of medical complications it is rare that more than 2 weeks' leave, which is granted only for institutional treatment, is necessary.

The controlled alcoholic is a good employee and he is good for other employees. He is worth saving, declared D'Alonzo.

Industry-Supported Clinic

The industry-supported Consultation Clinic for Alcoholism regards helping the patient to recognize his problem and motivating him toward treatment as important factors in re-

covery, stated Dr. Frances I. Colonna, acting director of the New York clinic.

The treatment of alcoholics can be fostered, she said, if the company's approach is a dual one: offering the alcoholic treatment at the clinic at the same time he is informed that the company feels he has a drinking problem. Also, by finding the patient in the early phases of his illness one hopes to prevent the consequences of unchecked alcoholism, which can lead to serious mental and physical changes, she said.

The clinic undertook the treatment of employed alcoholics in 1952 when its operation was underwritten by Consolidated Edison Co. of New York, Standard Oil Co. of New Jersey joining in later. Approximately 30 companies are now using its facilities. The clinic is under the direction of the departments of psychiatry and industrial medicine of New York University Medical Center.

The staff consists of an internist, psychiatrist, and psychologists. Following referral, the procedure includes a physical examination by the internist, laboratory and psychological tests, and an interview with the psychiatrist. An attempt is made to establish a relationship which will help to motivate the patient for treatment and to investigate those areas of his personality which are pertinent to the drinking problem, Colonna stated.

A treatment plan suited to the patient's needs

is formulated, she said. This may be individual psychotherapy of a direct supportive type, or for some, psychotherapy of a more probing nature. For many, group therapy offers the most effective treatment. They benefit from interaction with other patients. Various medical therapies are also used. The clinic may also enhance the treatment program by making use of community resources such as Alcoholics Anonymous and religious groups, and the family physician.

Since the clinic is open every day, it has been able to handle some patients in a state of acute intoxication by seeing them daily until they are ready to enter into long-term treatment, Colonna stated.

Among the advantages of a separate treatment center situated within a hospital are the disassociation of the treatment from the company. It is also of extreme importance that the patient feel his communications are confidential if he is to be free to express his feelings.

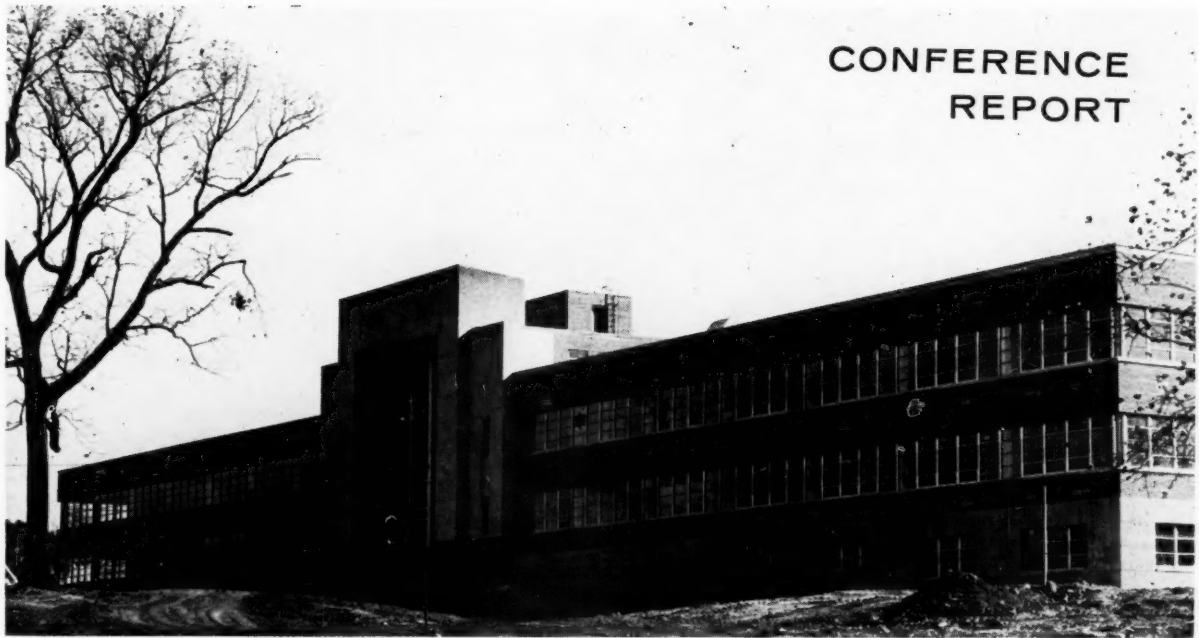
Such a clinic within a teaching unit also encourages the participation of a research-minded staff who are interested in understanding the problems of alcoholism in general. Extrinsic motivation provided by the company's procedure and intrinsic motivation as developed by the therapeutic situation make for the most favorable conditions for treatment and for bringing about constructive changes in the patient's alcoholism, Colonna concluded.

Median Salaries of Scientists, 1956-58

The median annual salary of scientists in the United States during 1956-58 was \$7,900, according to a National Science Foundation survey of its 1958 National Register of Scientific and Technical Personnel. About 137,000 scientists reported for the register during that period.

Other findings show that scientists in chemical engineering and the medical sciences had the highest median salaries (more than \$10,000), and those in the agricultural and biological sciences were lowest, with salaries below \$7,000. The highest median salary was reported by those in management or administration (\$11,000); those in teaching, the lowest (\$6,500).

About 250,000 scientists reported their professional and economic characteristics in May 1960 for the 1960 national register.



Blue Grass Progress

Dr. Russell E. Teague, State commissioner of health, presented a glowing progress report to the 12th annual meeting of the Kentucky Public Health Association in Louisville, April 6, 1960.

Despite the travail of moving that week to a new State health department building in Frankfort, he managed to outline a total health program geared to the times and to describe achievements and accomplishments to date.

Since 1955, Kentucky has had in each county a full-time health department. Formerly concerned mainly with communicable disease, vital records, and sanitation, their programs now include medical care, preventive services, and environmental control.

Reorganization of the State department was facilitated by a survey conducted at the commissioner's request by the Public Health Service. The document prepared by this survey was instrumental in providing the public and official support necessary to amplify the State's activities. Recognition by Kentucky of the need for additional health resources is further illustrated by the development of the University of Kentucky Medical Center to provide

training for physicians, dentists, nurses, and other health personnel. Rather than establish a graduate school of public health in Kentucky, the State appropriated a sum equivalent to \$1,500 per student per year to aid the three existing graduate schools of public health in the south.

A program to begin in January 1961 will provide medical care to recipients of public assistance. Jointly administered by the departments of economic security and health, the program's scope will be recommended by an 11-man advisory council. Payments for medical care will be on a cost basis. A local medical review committee consisting of three physicians and a dentist will be appointed in each county.

With Federal aid under the Hill-Burton Act, new health department buildings have been erected in 50 counties, and 12 more are under construction.

Two years' demonstrated experience in the home care programs for the chronically ill of seven selected county health departments has encouraged Teague to look forward to providing such care throughout the State. In this program, public health nurses, physical ther-

apists, nutritionists, health educators, and others of the county department staffs work under the direction of local private physicians.

A division of behavioral sciences in the State health department is expected to conduct research into the actualities of public attitudes, needs, and habits, especially to determine what the public will expect from medical care programs.

A new division of radiological health is to be set up this year. A file of sources of ionizing radiation in the State is already being established.

The occupational health program has been supported by heavy investments in instruments for appraising the working environment. A survey of occupational health facilities has also begun. Increased activities in air pollution will be established.

Employee health services in the department include a preemployment physical examination, first aid, and nominal medical care. Measures for control of tuberculosis have confined X-ray screening to suspect populations and have expanded tuberculin testing. Employees were authorized to claim 8 cents instead of 7 cents for mileage on private cars used officially.

On the whole, the Kentucky State Health Department battled 1,000 on legislation in the 1960 State General Assembly.

Alcoholism

Public health nurses at the Kentucky meeting devoted considerable time to discussions of the management of alcoholism.

They heard Dr. R. R. Knowles, superintendent of the Kentucky State Hospital, at Danville, state that it is a responsibility of public health agencies to establish in the public mind the concept that alcoholism is an illness, rather than a sin or a sign of degeneracy. The implication of this concept, he said, is that instead of scorning or punishing the alcoholic, society is prepared to seek the factors in the host and environment which promote, provoke, and perpetuate alcoholism. Health agencies, rather than courts and jails, may then be encouraged to treat the victims.

Public health professions, he said, may rise to their opportunity by learning how to rec-

ognize and manage incipient alcoholism, supporting treatment, developing rehabilitation services, and following up released patients to prevent a recurrence. A variety of educational programs, suited to diverse ages and cultures, he said, may prove to be the health agency's most important responsibility of all.

Dr. Robert Straus, chairman, department of behavioral science, College of Medicine, University of Kentucky, told the nurses that alcoholism usually tends to develop only after repeated exposures to high concentrations of alcohol in the bloodstream. He noted that the custom of drinking was not in itself a cause of alcoholism, but that variations in drinking customs were important factors in "exposure" to alcoholism.

In support of this, he noted that alcoholism was rare among Jewish and Italian families who were nearly all accustomed to taking wine with meals. On the other hand, among Irish families, although perhaps 40 percent touch no liquor at all, the incidence of alcoholism was relatively high.

The difference he related in part to the tendency in some cultures to drink distilled liquors, having a relatively high alcoholic content, with no foods in the stomach to slow down the absorption of alcohol. Their saying is, "Why spoil a good drink with food?" He mentioned also that some cultures tend to condone intoxication, especially in single males, whereas others frown upon it.

He mentioned also that the rate and volume of drinking will build up the high concentrations which predispose toward alcoholism. Drink for drink, he said, a lightweight will build up higher concentrations more quickly than a heavy person.

He observed that with drinking habits changing among Italian and Jewish families, as the younger members adopt the cocktail hour and distilled liquors instead of wines, alcoholism is becoming more frequent among them.

Responding to a question from the floor, Straus said that 20 years ago most people equated alcoholism with the "typical skidrow character." Since then, he said, some important research has led to a modification of the old concept of the alcoholic personality. Instead of being restricted to the skidrow homeless

man, the alcoholic is to be found in all ranks of society, high and low, in all kinds of occupations. Many are even able to function in a relatively stable and constructive manner during periods of sobriety.

The skidrow personality, he said, represents a different pattern. Typically he is a dependent personality, product of a broken home or orphanage, accustomed to having matters arranged for him, as in a military organization, the merchant marine, an institution, or a job in an institutional type of setting such as a lumber camp or a resort. Unaccustomed to demands on initiative, he may be frightened by some activity as simple as having to take a streetcar. If he drinks, it is often to cope with the terrors of an unprotected environment, said Straus. As a rule, his drinking is not addictive but planned; not seeking peak intoxication but a plateau of alcohol-induced oblivion from responsibilities. Sometimes he even uses drinking as a method for getting into the protective confines of the jail.

Straus cited these examples to emphasize the importance of realizing that drinking is usually a method of dealing with another kind of problem. The movement for social management of alcoholism, he said, is based upon this premise, and is moving therefore from a narrow focus on alcoholism to a consideration of pathological

drinking in the context of health and welfare needs as a whole.

Young people tend to drink, or smoke, he reminded his audience, because these appear to be the actions of adults, and they hope to attain adult status by this method in a culture where social maturation comes much later than biological maturation. To control these habits in the beginning, he said, other patterns for imitation of adults would have to have equal status.

Public health agencies, and nurses especially, he said, can do a great deal to improve the situation, even if they do no more than explain matters to the family.

Reviewing the session with the public health nurses, Miss Mildred Kingcade, consultant in the Kentucky Department of Mental Health, stimulated a general discussion which brought out specifically the suggestion that alcoholic patients discharged from hospitals could be referred to health agencies for followup.

The nurses also expressed some uncertainty about how to go about explaining matters to a wife whose husband has seized the grocery money and slammed her against the wall, on his way to the saloon.

The main consensus, however, was that nurses must learn to accept the alcoholic person as a patient, learn to listen sympathetically, and advise intelligently, if they are to help.

Alcohol and Highway Fatalities in Baltimore

A study of 500 consecutive highway fatalities in Baltimore, Md., in which victims died within 12 hours after injury, shows that 37.2 percent of 156 drivers killed were under the influence of alcohol or drunk, as were 26.3 percent of 137 passengers and 30.9 percent of the 207 pedestrians who died.

Results of the study, which covered motor vehicle casualties from January 1951 through April 1956, were presented at the 9th annual meeting of the American Academy of Forensic Sciences in February 1957 at Chicago, by Dr. Henry C. Freimuth, Spencer R. Watts, and Dr. Russell S. Fisher, of the office of the chief medical examiner, State of Mary-

land, and the University of Maryland School of Medicine, Baltimore.

A further breakdown of the figures revealed that 67 percent of the drivers under the influence of alcohol were less than 40 years of age and that 70.3 percent of the pedestrians definitely affected were above that age.

The State of Maryland has established the official definition of the expression "under the influence of alcohol" in terms of alcohol concentration. A 1959 law stipulates that an individual is in that condition if tests show alcohol concentrations of 0.15 percent by weight of his blood sample, an equivalent quantity of 2,000 cc. of his breath, or 0.20 percent by weight of urine.

Continuous Diabetes Screening in a Rural Area

WILLIAM J. MEYER, M.D., M.P.H.

FOR a chronic disease problem to justify the institution of a public health service program, it must conform to essentially the same criteria as other disease problems: (a) there must be available either a means of prevention or an effective treatment, (b) the problem must be of such a nature that it (or a significant part of it) cannot be solved by the traditional physician-patient relationship, (c) the problem must affect a significant number of people, and (d) it must have community significance.

Casefinding in diabetes mellitus conforms to the above criteria. Although no method of primary prevention is known other than control of heredity (which in our present society is not very practicable), early diagnosis and continuous medical supervision can prevent the early complications of diabetes, and some of the late complications can be avoided or postponed (1a). Relatively few people have formed the habit of presenting themselves for routine physical checkups, with the result that no opportunity is presented to diagnose an estimated 50 percent of those who have diabetes. The problem is large; it is estimated that there are over 2 million diabetics in the United States (1b), half of whom are unknown. Finally, the disease has an important degree of significance to the community, as it causes a considerable amount of disability, premature death, loss of productivity, and increased demands on health and welfare facilities (2).

Dr. Meyer was health officer for the Glens Falls District, New York State Department of Health, at the time this paper was written. He is now director of health in Bucks County, Pa.

Diabetes detection programs have been conducted for some years and are an accepted part of the public health scene. There are many types of programs, which vary, in time, from 1-day drives to year-round activities, and in technique, from rapid screening for sugar in the urine to exact, painstaking, and expensive blood determinations.

Justification for the operation of a diabetes detection program is based on the hypotheses that diabetes mellitus is often unrecognized and asymptomatic in the adult; that early diagnosis and treatment of diabetes improves prognosis and reduces complications; and that it is practical to screen postprandial hyperglycemic individuals from the general population by means of a community-operated clinic service (3).

One of the best methods of conducting such a screening program is by means of the test developed by Wilkerson and Heftmann (4), using the clinitron. This apparatus provides a rapid, inexpensive, and reasonably accurate method of screening large groups of people.

Permanent, year-round diabetes screening programs using the clinitron seem to have been restricted thus far to urban populations. On March 1, 1958, the Glens Falls District Office of the New York State Health Department began a continuous screening program in a rural section of upstate New York, including Saratoga, Warren, and Washington Counties. Data during the first 10 months of operation are presented in the hope that they will contribute toward closing the gap between urban and rural public health practice in diabetes screening.

The population of this tricounty area approximates 177,000, 25 percent of whom live in

three small cities and the rest in rural and semi-rural areas. The median income of the area is above the national average, and its population is well served by the usual number of official and voluntary health agencies. General concern and information about health matters is comparatively good.

Method

The diabetes screening program is conducted in itinerant clinics which everyone 20 years of age or older is eligible to attend. The bureau of chronic diseases and geriatrics of the New York State Health Department supplied a clinitron (on loan from the Public Health Service), a trained technician to conduct the clinics, and sufficient reagents and equipment to start the program. The local tuberculosis and health associations in the three counties donated a total of \$325 for the purchase of operating supplies in addition to those supplied initially by the bureau.

The technician carries to each clinic the necessary supplies with which to register and take blood specimens from those attending. A specimen consists of 0.1125 ml. of arterial blood taken from a fingertip, which is mixed immediately with 5 cc. of fluoridated distilled water (approximately 1 grain sodium fluoride per gallon of distilled water). At the end of each clinic the technician returns to the district office, where the clinitron is permanently set up, and runs the specimens through the clinitron. Practically all are processed within 24 hours, and in no instance do they stand more than 48 hours, although by fluoridating the diluent a delay of several days is considered permissible (4).

Clinitron testing of 0.1125 ml. specimens, using the appropriate reagent tablet, gives positive results for specimens with blood sugar levels of 160 mg. or more (4). For the first 5 months of program operation no attention was paid to the time interval between the last meal and the time when a blood specimen was obtained. However, because some of the local physicians complained that too many of the test results were false positive, from October 1, 1958, to April 1, 1959, no one was tested who had eaten less than 2 hours before clinic time.

Since April 1, 1959, all persons have been tested as they presented themselves, regardless of time since eating.

This misunderstanding points up the failure of our attempts at professional education. Before the program was started, several meetings with each of the three county medical societies were held to explain the details of the screening program. At these meetings we tried to establish a standardized procedure for followup by asking the physicians to determine at least one postprandial blood sugar level for each of the patients referred to them with positive screening test results. We emphasized the recommendation of Wilkerson and Heftmann that a blood sample for screening by the clinitron be taken shortly after a meal, and announced that clinic sessions would therefore be scheduled at times when most screenees would be in a postprandial state.

To reinforce these points and the details of the program, a letter was sent to each physician in the district, repeating what had been said at the medical society meetings. However, the educational aspect of these presentations apparently misfired, as the majority of the physicians still believe that fasting specimens are the only proper ones to take.

For the first 2 months of program operation, the only specimens screened were obtained, in their offices, by about one-third of the private physicians of a single county. The technician for the screening program collected these specimens twice a week. However, the number of specimens supplied by physicians fell off rapidly after the first 6 weeks, and once the community clinics started up, the technician no longer had time to collect them. We found it impossible to recruit volunteers for this purpose, and so, beginning in May 1958, collection of specimens from physicians' offices was abandoned and program efforts were concentrated on local clinics.

Every community in the district was listed and a schedule of clinics set up so that each would have at least one clinic a year. At first, the basis for scheduling more than one clinic a year for certain communities was size of population, which varied from a few hundred to 20,000.

County public health nurses participate in

Table 1. Results of diabetes screening, March 1–December 31, 1958, Glens Falls Health District, N.Y.

Results	Number (3,851)	Percent (100)
Positive test results.....	183	4.8
Confirmed positive ¹	102	2.7
Previously known.....	51	1.3
Previously unknown.....	51	1.3
False positive ¹	76	2.0
Final diagnosis unavailable..	5	.1

¹ According to physicians' diagnoses.

the program in two ways. Because of their familiarity with the communities and their experience in recruiting volunteers, county public health nurses were asked to recruit and brief volunteers for the program. At each clinic, volunteers act as registrars, arrange for clinic sites, and help spread the word about the clinics. The nurses also follow up persons whose tests are positive and who do not report to their personal physicians for further testing.

All available mass publicity media are used. Arrangements have been made for frequent radio spot and station break announcements. Before the screening program started and during its early operational stages, local newspapers carried a number of informational articles. They publish clinic schedules and articles urging everyone over the age of 20 to attend a clinic and those with positive tests to obtain more definitive diagnostic services from a private physician. The local public health nurses and the volunteers they have recruited conduct a

word-of-mouth publicity campaign for the clinics. In each locality the campaign is stepped up for several weeks before a clinic is scheduled to be held in the area.

Results

During the first 10 months of operation, March 1 through December 31, 1958, a total of 3,851 specimens were tested, with 183, or 4.8 percent, testing positive. Of these 183 positive tests, a final diagnosis is available for 178, with 5 cases lost to followup. Seventy-six of the 178 proved not to have diabetes, 51 were previously known diabetics, and 51 new, previously unknown diabetics were discovered. These 51 previously unknown diabetics constitute 1.3 percent of the total number tested. Table 1 shows these results.

Table 2 gives the number and percent of the total population tested and the number of new cases found among those for whom age was known, by age groups. The highest percentages of total population tested were within the 40- to 70-year age group, the primary target for diabetes screening (5). Although this age group represented only 63 percent of those tested, 78 percent of the previously unknown cases of diabetes fell within it.

Table 3 shows the percentage deviation from normal weight for those tested, those who tested positive, and those proved to have diabetes. Of the persons with positive tests, 46.5 percent were overweight by 20 percent or more. This may be compared with 26.0 percent over-

Table 2. Age and sex distribution of confirmed new cases of diabetes in relation to total population and persons tested, March 1–December 31, 1958, Glens Falls Health District, N.Y.

Age (years)	Total population			Number tested ¹			Percent of total population tested ¹			Previously unknown cases		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
All ages.....	177,636	87,424	90,212	3,735	1,176	2,559	2.1	1.3	2.8	51	17	34
0–19.....	57,031	28,532	28,499	72	30	42	0.13	0.1	0.15	0	0	0
20–39.....	50,120	24,536	25,584	1,066	321	745	2.1	1.3	2.9	6	2	4
40–49.....	22,650	11,235	11,415	889	282	607	3.9	2.5	5.3	10	2	8
50–59.....	19,758	9,809	9,949	842	244	598	4.3	2.5	6.0	14	5	9
60–69.....	15,778	7,740	8,038	608	195	413	3.8	2.5	5.1	16	7	9
70 and over.....	12,299	5,572	6,727	258	104	154	2.1	1.9	2.3	5	1	4

¹ Includes only those for whom age is known.

Table 3. Deviation from normal weight¹ of screenees for whom weight was known, March 1–December 31, 1958, Glens Falls Health District, N.Y.

Test results	Number			Percent overweight						Percent underweight					
				Any amount			20 percent or more			Any amount			20 percent or more		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total persons tested	3,703	1,145	2,558	73.5	78	72	26	22	28	26.5	22	28	1.6	1.3	1.8
Total positive tests	178	75	103	84	84	85	46.5	36	54	16	16	15	0	0	0
Confirmed positive ²	102	44	58	83	82	84	48	34	55	17	18	16	0	0	0
Previously unknown	51	17	34	83	85	82	51	46	54	17	15	18	0	0	0
Previously known	51	27	24	84	81	87	45	35	57	16	19	13	0	0	0

¹ According to standard height-weight tables of the Metropolitan Life Insurance Company.

² Percentages are expressed in relation to number of positive tests.

weight to the same degree in the total population tested. The difference in percentages is essentially the same in those proved to have diabetes. Conversely, similar comparisons for those who are underweight show consistently lower percentages, while no person 20 percent or more underweight had a positive test. These findings conform to the usually held concepts concerning the relationship between diabetes and obesity.

Table 4 shows the relationship between those with positive tests and those with positive tests confirmed, according to the interval between the last meal and the time of test. It will be seen that both the case rate and the percentage of false positives fall off after 1 hour, indicating

that the test becomes less sensitive but more specific with the longer intervals after eating.

The source of referral to screening clinics for those patients who indicated a source was as follows:

Referral source	Patients
Private physician	400
Public health nurse	99
Newspaper	2,283
Radio	110
Family	30
Friend	219
Health agency	23
Other	528
Total	3,692

The newspaper has been the most effective source of publicity so far. However, it is likely

Table 4. Results of diabetes screening tests, according to time between last meal and taking of blood specimen for screenees on whom time interval was known, March 1–December 31, 1958, Glens Falls Health District, N.Y.

Time interval between last meal and test (hours)	Total tests	Positive test results			Case rate (percent confirmed positive of total tests)	Percent true positives of total positives
		Number	Percent of total tests	Number confirmed		
Total	3,690	136	3.7	74	2.0	54.4
Less than 1	898	58	6.5	26	2.9	44.8
1–2	1,515	46	3.0	25	1.7	55.3
2–3	911	24	2.6	17	1.9	70.8
3 or more	366	8	2.2	6	1.6	75.0

that many were motivated to attend clinics by local word-of-mouth publicity and were merely reminded of the time and place through the newspapers.

Costs

Table 5 gives the actual cost of the program for the first 10 months, so far as can be determined. No charge has been made for such items as light, heat, stationery, and office space, as it is impossible to determine these with any degree of accuracy. The item for stenographic services is somewhat arbitrary and has been taken as 25 percent of one stenographer's total time. This figure is derived from the actual stenographic time spent on the program during a 10-week interval.

Tables 5 and 6 separate expenses into fixed and variable types, because such a method provides additional information of value in predicting the future cost of the program as it expands. The fixed cost per test performed in the first 10 months of operation was \$1.07 and the variable cost was 32 cents, a total of \$1.39. Similarly, the costs per new case found were \$80.55, \$23.99, and \$104.54, respectively.

These costs are approximately 50 percent higher than those reported for programs in urban areas (3,6). The excess is almost entirely accounted for by two facts: our program is itinerant in nature and therefore involves a considerable amount of travel expense, and it is conducted as an independent unit. Other programs in this general area of New York State

Table 6. Relationship of diabetes screening costs to results, March 1–December 31, 1958, Glens Falls Health District, N.Y.

Type of cost	Cost per person screened (N=3,851)	Cost per new case (N=51)	Total expense
Fixed cost-----	\$1. 07	\$80. 55	\$4, 107. 85
Variable cost-----	. 32	23. 99	1, 223. 61
Total-----	1. 39	104. 54	5, 331. 46

are usually conducted in conjunction with chest X-ray clinics, which makes it possible to divide certain costs between the two programs.

A word of caution is in order here. Comparison of costs in this program with the others mentioned is improper except in the very broadest sense. No uniform method of accounting has been used in the various programs, and therefore comparison between specific items is impossible. Only very large differences in costs can be indicated with the figures available.

Administrative Problems

Of the four operational problems encountered, the first was in deciding where clinics should be held. As this was a new program to the local staff, there was no way of telling how large a community was necessary to make it worthwhile to hold a clinic, nor was there any way of predicting local response. Therefore, every concentration of population of more than

Table 5. Operating costs of diabetes screening program, March 1–December 31, 1958, Glens Falls Health District, N.Y.

Expense	Fixed cost	Variable cost	Total cost
Technician's salary (\$2,990 per year)-----	\$2, 491. 67		
Stenographer's salary (\$3,610×¼ for ¾ of a year)-----		\$601. 67	
Technician's expenses:			
General (meals, etc.)-----	378. 75		
Auto (16,600 miles @ 5 cents a mile)-----	830. 00		
Depreciation (\$300 per year)-----	250. 00		
Equipment ¹ -----	157. 43		
Supplies ² -----		421. 94	
Postage-----		200. 00	
Total-----	4, 107. 85	1, 223. 61	5, 331. 46

¹ Includes depreciation on glassware, clinitron, refrigerator, and miscellaneous equipment.

² Includes reagents, cleaning materials, finger lancets, cotton balls, alcohol. Excludes cost of stationery.

a few houses was assigned at least one clinic, with the thought that after a full circuit, those found unprofitable could be dropped from the schedule. This was a fortunate decision, for our experience indicates the size of the community in no way determines the public response. Some of our largest clinics have been held in areas that were sparsely populated.

Second, not all physicians use the same tests to verify a tentative diagnosis of diabetes. In this part of New York State, methods of diagnosing diabetes vary from examining random urine specimens to postprandial blood sugar tests.

At the beginning of the program, physicians were requested to determine at least one postprandial blood sugar for patients referred to them with positive tests. In practice, only a few have used this test. The great majority have used a single fasting blood sugar determination. Two or three of the more thorough physicians use glucose tolerance tests, while two perform only random office urinalyses in spite of the fact that they have been advised that the clinitron test is a more sensitive indicator of diabetes.

A third difficulty has been to obtain reports from physicians of final diagnoses for patients with positive screening results. In well over half the cases, two letters have been necessary, and in many instances a further reminder by telephone has been required. No physician has objected to supplying this information, but the general professional distaste for paperwork and its growing volume have increased the time spent in followup.

Finally, although considerable publicity through mass media has been maintained, it has been difficult for the district health officer to find adequate time for this very important aspect of the program. We feel that only the least possible amount of publicity consistent with results has been provided, and that, if more time were available for this purpose, response to the program could be significantly increased.

Discussion

The major purpose of the diabetes screening program was to provide a local casefinding program for one more of the serious chronic

diseases, with the long-range goal of testing 10 percent of the population over the age of 20 each year. A secondary purpose was to increase knowledge by designing a successful rural application for a program which has heretofore been restricted to urban areas.

Much needs to be done in adapting programs for dispersed populations. Costs, local relationships, local participation, and many other administrative factors which determine the success or failure of a program vary in urban and rural settings. It is felt that in this program a good start has been made toward solving these problems.

It must be freely admitted that taking specimens 2 hours or more after the last meal is undesirable from a casefinding point of view, since it leaves undiscovered cases among those screened. Because of local unwillingness to accept the proportion of false positive results which occurs at high levels of test sensitivity, it was necessary to reduce the sensitivity of the test in order to increase its specificity. At present, there are signs that the program is gaining in acceptance. We hope that after the second year of operation the program will have proved of sufficient worth that specimens can be taken in accordance with the recommendations of Wilkerson and Heftmann.

The failure of most physicians to test individuals with positive screening results by determining a minimum of one postprandial blood sugar is a definite drawback and almost certainly causes a significant number of mild or latent diabetics to be overlooked. We can only hope these people will return for retesting at subsequent clinics, when some, at least, will present a more advanced and more easily diagnosed stage of the disease. We hope, also, that this will happen before too many of the adverse effects of diabetes have had a chance to assert themselves.

I have mentioned that the size of clinic attendance often bears no relationship to the size of the local population where clinics are held. The most successful responses seem to be related to the effectiveness of the word-of-mouth publicity by local volunteers and public health nurses. One of our current objectives is to identify the factors involved and apply them more universally.

A serious objection to the program at the present time is the high cost per test performed and per new case of diabetes found. Although \$104, the cost of finding a new case, compares favorably with that of finding a new case of syphilis or of tuberculosis, the situation is not exactly comparable. Though an unknown case of diabetes does not create new cases, it represents cost to the community in the form of disability, loss of productivity, premature death, increased welfare costs, and increased load on health facilities. Nevertheless, we feel that, compared with the cost of casefinding in urban settings, this figure is not excessive, but it is still too high (3,6).

Costs are expected to come down. By far the greater portion of these costs are fixed. Therefore, for every additional increase in the number tested, there will be a much greater proportional decrease in the cost per test and the cost per case found. It is expected that for at least the next several years the number of people tested will increase, thus automatically lowering both costs. However, unless some way is found for absolute reduction of the fixed cost, there is no hope of approaching the cost level in urban programs.

The number of new, previously unknown, diabetes cases found represents 1.3 percent of those tested. This is greater than both the usual estimates and the actual experience of similar programs. No explanation is immediately available.

Summary

A year-round diabetes detection program was established in March 1958 in a tricounty rural section of upstate New York (Saratoga, Warren, and Washington Counties). The program's objectives are to offer a casefinding service in a serious chronic disease and to provide

answers for some of the unsolved administrative problems in rural public health practice. Evaluation procedures were built into the original program design to permit periodic analysis.

Of the 3,851 persons tested during the first 10 months of operation, 1.3 percent proved to have previously unknown diabetes. This figure is undoubtedly low because of (a) the time interval between the last meal and the test and (b) the general non-use of postprandial blood testing by private physicians making final diagnoses of screenees with positive tests. This inadequate followup testing of positive screenees poses a problem for which no effective corrective action has as yet been devised.

Among the unsolved administrative problems the factor of cost looms large. It is felt that with expansion of the program as time goes on this difficulty will be reduced. The long-range goal is to test 10 percent of the population over the age of 20 each year.

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Epidemiology of Endemic Cholera

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THE MAIN epidemiological features of endemic cholera have been long known, with some of the original observations dating back nearly a century. The available information has been reviewed extensively by Pollitzer (1), and unless otherwise stated, all references are taken from this monograph.

By the end of the 19th century, the areas of endemicity had been clearly defined, the nature of the countryside in which it was found was described, the relationship of the disease to the weather, especially the monsoon, had been noted, and the inability of *Vibrio cholerae* to survive for long periods in water containing large numbers of competing organisms and the potentialities of the village tanks, or ponds of surface water, in spreading infection had been observed. The fact that the cholera vibrio could withstand a very high pH had been discovered and indeed utilized in isolating the organism in pure culture.

However, efforts to provide an explanation for these features have so far been unsuccessful. In this paper we have reexamined and confirmed some of these epidemiological features and offer a theory and supporting data to explain them.

The theory is that the tanks of water are, in fact, the main means of spread of the infection; the seasonal fluctuations of the disease and possibly the limitations of the endemic area are the results of fluctuations in the pH of the tank

water. Examination of a number of tanks over a period of a year has shown that in sunny weather the pH commonly rises from about 7.0–7.5 in the morning to as high as 10.0 and occasionally to 10.5 in the afternoon. But when it rains this rise is prevented, and the pH may fall below 7.0. These fluctuations are the result of the activity of the algae in the water which liberate either carbon dioxide or oxygen according to the intensity of the light available. This range of pH's would give an advantage to the vibrio in the water over other intestinal organisms and permit them to survive, and, through natural selection, may have been responsible for producing the alkaline-resisting capacities of the organism.

Epidemiology of Cholera

Cholera has been known as a distinct entity since 1817. In severe epidemic classic form it appeared in Calcutta in 1817 and spread rapidly around the world in a great pandemic that was repeated no less than five times in the 19th century. The epidemiology of the epidemic type of infection was clearly worked out, with the spread being along the trade and pilgrim routes through the agencies of bad hygiene, polluted water, flies, and overcrowding. The most significant feature of these 19th century pandemics was that they died away, leaving no permanent foci outside Asia. In the 20th century these Asian foci rapidly dwindled down to one or two sharply localized areas. Today, the disease does not exist in Russia or China (personal communication from Prof. B. H. Pastukhov, of the 1958 Soviet Medical Mission to East Pakistan) or in Japan, the Philippines, Indonesia, or Ceylon (1), except when introduced from outside. In Thailand, cholera ap-

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pears for about 3 years at a time, but then is not seen for 5 or 7 years. It is not known whether the infection is endemic there or is repeatedly reintroduced. The only place where it has been found with regularity all the year round, year after year, decade after decade, has been the Indian subcontinent.

At the beginning of the 20th century, cholera seems to have been endemic in Burma, Bengal, and on the east coast of India near the sea and associated with rivers. However, in the course of 50 years, the geographic distribution of the endemic infection has progressively dwindled so that today, although the epidemic type is still likely to appear in most parts, only Bengal remains a permanent focus. Further research may show that cryptic or undiagnosed cholera is present in all seasons and years in places like Burma, Nepal, and Thailand; but until this has been demonstrated, Bengal must be regarded as the primary source of all epidemics. Therefore, should the infection be eliminated from Bengal, it would almost certainly disappear from the world.

The Endemic Area

Bengal is mainly the land formed by the Ganges-Brahmaputra Delta. In the 1947 partition it was divided between India and Pakistan, and the eastern half is now East Pakistan. Ecologically, the two sides differ significantly; West Bengal has an enormous urban population centered on Calcutta, while East Pakistan is one of the most rural countries in the world. There are only two large towns in East Pakistan, Dacca with about 600,000 population and Chittagong with 300,000 and these have reached these proportions only since partition. So far as the cholera vibrio is concerned, Bengal must be regarded as one unit, for considerable numbers of people, presumably carrying with them the causal organisms of the disease, still move across the border.

Calcutta was founded by the British in the 18th century, and one is tempted to suggest that there is an association between this newly created concentration of people and the appearance of the disease in epidemic form in 1817. It is a great sprawling slum with most unhygienic conditions. The overcrowding is gross, and

every night large numbers of people sleep on the streets and in the railway stations. Poverty is everywhere, and beggars are numerous. Half of the water supply is simply untreated crude river water. The river itself is highly polluted, and the cholera vibrio has been found in it at most times of the year.

East Pakistan is different. Here, about 45 million people, more than 95 percent of the population, live in small communities, each with its own farming area. Some have only a few individuals of one family, while others may hold up to several hundred persons. Where the land is most suitable for farming, the communities are smaller and only a hundred yards or so apart; where flooding is frequent, they are farther apart and larger. Since each group of houses is hidden by trees and surrounded by apparently empty fields of rice and jute, at first sight the countryside seems almost uninhabited; in reality it is one of the most heavily populated areas of the world, with nearly 1,000 persons per square mile.

The land is flat and only a few feet above sea level. Dacca Airport, about 100 miles from the sea, is 24 feet above sea level, and much of the coastal area is actually below the high-tide level, being protected by a system of dikes. The heavy rainfall of the monsoon and the huge masses of water pouring down the Ganges and Brahmaputra Rivers cause extensive flooding, and in most years about one-third of the land disappears under water. In real flood years, such as 1954, the larger portion of the delta area is submerged.

The inhabitants have become adapted to life under these conditions during many centuries. To cope with the floods, each hamlet or village has been built on a mound. The holes in the ground made by digging soil for these mounds are the tanks, and each village is usually surrounded by a number of them. In dry weather these tanks are the source of the water for the community, and a center of social life. Everyone visits them daily to wash clothes, for ablutions, to swim, to collect water for drinking and cooking, to fish, or to wash a cow or a buffalo. Sometimes there is a latrine perched on one end, and commonly when it rains the surface water from the houses flows into the tanks.

The houses are usually clean, with polished



Woman drawing water at a tank as her family waits on the bank

beaten mud and dung floors and little refuse lying around. Flies are not a major problem except around cattle sheds, and in the monsoon they are almost absent. Each family stores the year's supply of rice in large pots. After the monsoon starts in July, the mounds with their dwellings stick above the water like little islands. Nearly all roads disappear, and the villagers travel by their boats, which during the dry weather have been lying submerged in the tanks. At any time the rivers are the main highways of the Eastern Province, but during the monsoon almost everything goes by water. Water transport by sail or oar is slow, and 10 miles can be a hard day's journey. North of Dacca, the land rises slightly and is more heavily wooded, so that these conditions are found largely only along the rivers.

Patterns of Occurrence

In Bengal cholera occurs all the year round in both the rural areas and Calcutta. Calcutta has long been the industrial and commercial

heart of Bengal, and every day tens of thousands of people from the rural areas pour into it, although since partition those from East Pakistan have been diverted to Dacca. Since the infection is, without doubt, endemic in the rural areas, almost every day the vibrio must be reintroduced into Calcutta and Dacca.

Many years ago a number of workers delineated the extent of the rural endemic area in Bengal. It consisted of the coastal region and extended inland to include Rajshahi District. North of that, cases of cholera were numerous, but only in the dry season. This situation is much the same today. In figure 1, based on the weekly reports of the Province's Directorate of Health Services, the districts of East Pakistan are marked according to the proportion of weeks in which cholera was reported over a 4-year period. About 150 miles inland, parallel to the coast, but now south of Rajshahi, there is a clear line of demarcation. North of this endemic borderline cholera is reported in the dry season only, 40 percent of the total weeks or less. South of it, the disease occurs 70-100

percent of the weeks, or all year round when allowance is made for the deficiencies of the reporting system.

On a map of the Province marked with 250-foot contours, the endemic and nonendemic areas seem to be identical except for some slightly higher ground north of Dacca and the range of hills to the east. However, in this flat land even a few feet make a big difference, and in general, except for the land along the river bottoms, the terrain rises gently to the north of the endemic borderline; south of it the land is universally flat and barely above sea level. This affects drainage, for as described by Macnamara, the water in the endemic area is almost stationary in the dry season.

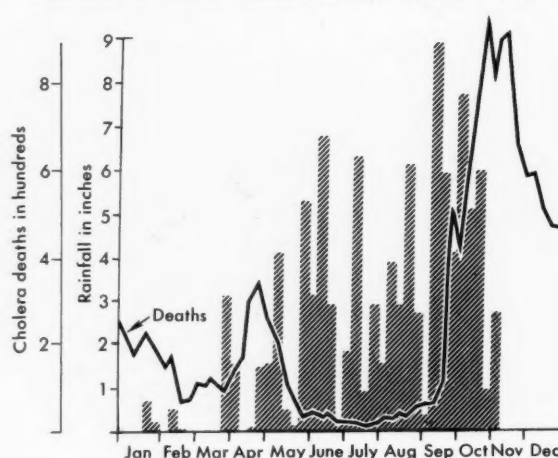
The spread of cholera in the rural area differs from that in the city, for there is little overcrowding in the small hamlets except during the monsoons. There is also a relatively large

Figure 1. Percent of 208 weeks when cases of cholera were notified, by district,¹ East Pakistan, 1956-59



¹ No districts reported cases for 40-70 percent of the total weeks.

Figure 2. Rainfall in Dacca and deaths from cholera in East Pakistan, by week, 1959



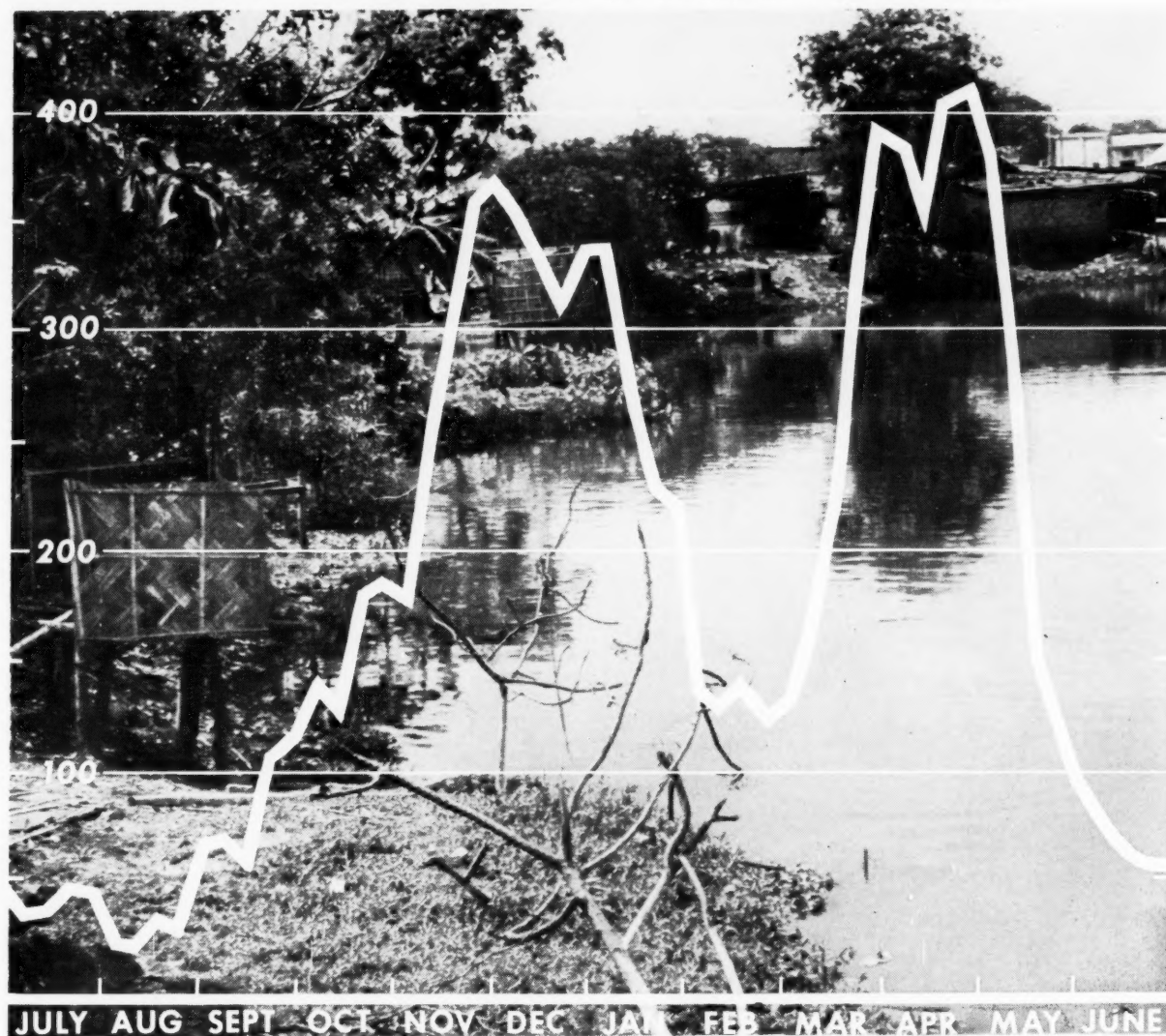
NOTE: The lag in case reporting of deaths may be as much as 2 weeks.

degree of isolation between the tiny communities since the women are in purdah and seldom leave the home, and most travel is on foot or by the slow-moving boat. Except for the tanks and the methods of excreta disposal, the hygiene of the communities is of a fairly high standard.

It was Koch who first suggested that the tanks might be the most important means of spread, and many other workers have agreed with him. When the whole population washes in the water used for drinking and cooking, there must be a communal sharing of intestinal organisms. Most communities have isolated and screened latrines, but sometimes these are perched on the edge of the tanks, so that the water is further polluted. Toward the end of the dry season in April and May the water has sunk to a low level and become stagnant and unpleasant. Beyond doubt the tank is the greatest means of spreading the cholera vibrio during the greater part of the year. However, it is not the only means. The factors of personal contact, flies, and infected food still play a part, if only a minor one, especially in the larger villages, the overcrowded and insanitary "old" towns of Dacca and Chittagong, and in the crowded trains and other public transport systems.

That the tanks are closely implicated in the spread of infection is indicated by the epidemiology of the infection in the endemic areas. There are two kinds of occurrences. In the

Figure 3. Deaths from cholera in East Pakistan, by month, 1954-59 average



Photographic background shows latrines perched on the edge of a tank.

first, only one or two persons, usually small children, become ill in a village; in the second, 20 or 30 persons acquire cholera within 1 or 2 days and then only a few more, indicating an explosive common-source infection. The former type of outbreak is probably expressive of the immunity status of the village, in which only the small children are still susceptible, while the latter can be explained best on the basis of some vehicle of spread common to everyone, such as the tank water.

Traditionally, the cholera seasons ends with the onset of the monsoon (fig. 2). The abatement of local epidemics whenever a heavy, unseasonable rainfall occurred in the dry season of 1958 has been described elsewhere (2).

The influence of temperature has been less well recognized. When deaths from cholera in East Pakistan are averaged over a 5-year period, a smaller cholera cycle during the winter months can be recognized in addition to the major cycle during the dry months (fig. 3). As the days grow shorter and colder, cholera diminishes, although there is some lag from the fall peak in November and December. Rainfall, sunshine, and temperature data are given in table 1. The peak periods for cholera are in the hot months of the year when there is no rain.

Two exceptional years in the past decade were 1953 and 1954. In 1953 the monsoon finished earlier than usual, the cholera season

started sooner, and the incidence was higher than normal. In 1954, flooding was extensive, largely due to unusually heavy flows down the Brahmaputra. Most of the delta was under water, some of it for as long as 3 months. During that time cholera was at a particularly low level for East Pakistan.

Experimental Theory

There have been many attempts to explain the epidemiology of cholera by changes in the physical conditions of water, but so far none have been successful. There is no difficulty in finding the vibrio in the rivers around Calcutta or in places such as the tanks where religious washings take place, but the difficulty is in accounting for the relationship between the rainfall and temperature and the appearances of outbreaks, as well as the confinement of the endemic disease in so small an area.

The one feature that sets the vibrio apart from all other intestinal pathogens is its capability of thriving in media that are highly alkaline. The upper limits of resistance to pH do not seem to have been clearly defined, but the organism can multiply at a pH of 9.2 and probably survive for long periods at a much higher pH. Generally in biology, characteristics so marked as these are not due to chance, but are the results of intense natural selection pressures in the environment. It seemed to us that the water in the tanks might have alkalinities of a magnitude that would provide the necessary selection pressures and that the seasonal and geographic relationships of the disease could be accounted for by variations in the pH. Other workers have studied this matter, but they emphasized chiefly the river water and not the tanks, and no allowance was made for the biological activity of the algae in the water at different times of the day.

The tanks in Bengal contain so much algae that normally the water is a deep green color when it is not muddied. The concentration of algae and the rate of photosynthesis at any given time are the result of a highly complex interplay of many factors, but the major ones are the amount of organic and inorganic matter in the water and the amount of light available. Related to the photosynthesis, but not proportional

Table 1. Length of day, sunshine, rainfall, and mean temperature, by month, Khulna, East Pakistan, 1959

Month	Day length (hours)	Sunshine (hours)	Temperature ¹ (degrees Fahrenheit)	Total rainfall (inches)
January	11. 00	9. 57	68	0. 4
February	11. 25	9. 34	74	1. 0
March	12. 00	8. 00	81	1. 3
April	12. 40	7. 55	86	3. 9
May	13. 10	7. 10	87	7. 4
June	13. 30	4. 43	85	12. 0
July	13. 25	4. 52	84	14. 4
August	12. 55	4. 01	84	13. 2
September	12. 20	4. 88	85	8. 4
October	11. 40	5. 70	82	5. 4
November	11. 05	8. 82	76	1. 0
December	10. 50	9. 03	70	. 1

¹ Highest recorded, 107° F., lowest recorded, 39° F.

SOURCE: Report on the Khulna Multipurpose Project, East Pakistan Water and Power Development Authority, 1959.

to it (β), is the respiration of water plants. Since the rate of photosynthesis is normally faster than the rate of respiration, in daylight these plants absorb carbon dioxide from and liberate oxygen into the water. At night the reverse process takes place. Also, photosynthesis is inhibited by too much sunlight (β). Beyond the optimum, the rate of activity falls rapidly, so that in bright light the maximum respiration of the algae will take place not at the surface of the water but deeper down, and in shallow surface water this factor might be of importance.

Since the endemic areas are closely linked to lands very little above sea level, and the vibrio is known to have a salt requirement, a brief exploratory study was made to see if the endemicity could be linked to the salinity of the water.

It is well known that the cholera vibrio does not live long in river water such as that of the Ganges and Nile or in sewage, and the usual explanation is that in such places it cannot cope with the competition of other organisms. In Bengal, if it could be shown that tank water has a high pH, the situation would be reversed, for intestinal organisms such as *Salmonella typhi* would soon die off (table 2), and the cholera vibrio would survive. Should testing of sur-

face waters in other parts of the world reveal different pH levels, an explanation would be provided for the limitation of the endemic area to small parts of Asia.

However, when heavy rain muddies and dilutes the tank water and the sky is overcast with thick clouds, the pH might not rise, and the cholera vibrio would then lose its advantage in survival. If such a situation could be shown to exist, then a reasonable explanation could be given for the well-known phenomenon of the disappearance of cholera during the monsoon.

Cholera diminishes regularly almost every year in the winter months when little or no rain falls (fig. 3). This dwindling of cases could possibly be caused by variations in the pH due to a drop in temperature, shorter days, and fewer hours of sunlight per unit of water surface area.

Collection of Samples

Therefore, it was decided in 1959 to test six tanks in the Motijheel area of Dacca for 1 year to see how the pH of their waters varied during changing climatic conditions and to attempt to correlate these changes with the general incidence of cholera.

The tanks were typical of those throughout the Province, except that people did not drink so much from them, since piped water was available. The people used all the tanks for washing clothes, ablutions, swimming, and fishing. Professional dhobies washed clothes in tanks 1 and 2; bullocks and buffaloes were often cleaned in tank 2; 3 had a latrine on one edge; and tanks 3, 4, 5, and 6 were close to houses whose drainage had access to the tanks. Tanks 1 and 2 were open to the sun from sunrise to sunset, while the others had a varying number of one- or two-storied houses or shacks and an occasional tree close to them. The tanks ranged in size from 50 by 100 yards to 100 by 200 yards and in depth from 4 to 18 feet.

Samples of water were usually collected from

the six tanks every Monday. The water was taken from the same spot every time and from about 6 inches under the surface. Most of the time, specimens were taken three times in the day, at 5:30 to 5:45 a.m., at 11:30 to 11:45 a.m., and at 3:30 to 3:45 p.m. In a series of more intensive investigations two of the tanks with the largest ranges of pH were sampled six times in the day at 2-hour intervals beginning at 5:30 a.m. During the summer, it was daylight at 5:30, but dark during the winter.

The 5:30 a.m. specimens were kept in the dark until the laboratory opened at 8:00 a.m.; the others were all tested within half an hour of collection. Attempts were made to test water outside Dacca, especially in the nonendemic areas. After sensitive paper proved unreliable in determining the pH, a portable pH meter was used to test water on a trip to the southern end of the endemic area.

Analytical Procedures

The analytical determinations were made in the Dacca laboratory of the Ralph M. Parsons Co., of Los Angeles, Calif., which, under an ICA contract, collects data needed for its design of water supply and sewage disposal systems for Dacca and Chittagong. This laboratory is equivalent in scope and equipment to public health laboratories in the United States. After completion of the contract, the laboratory will become the nucleus of the water and sewage section of the new public health laboratory for East Pakistan. The initial specimens were tested by Dr. Gordon E. Mau, and the later ones by Jack R. Snead, both of the Parsons firm.

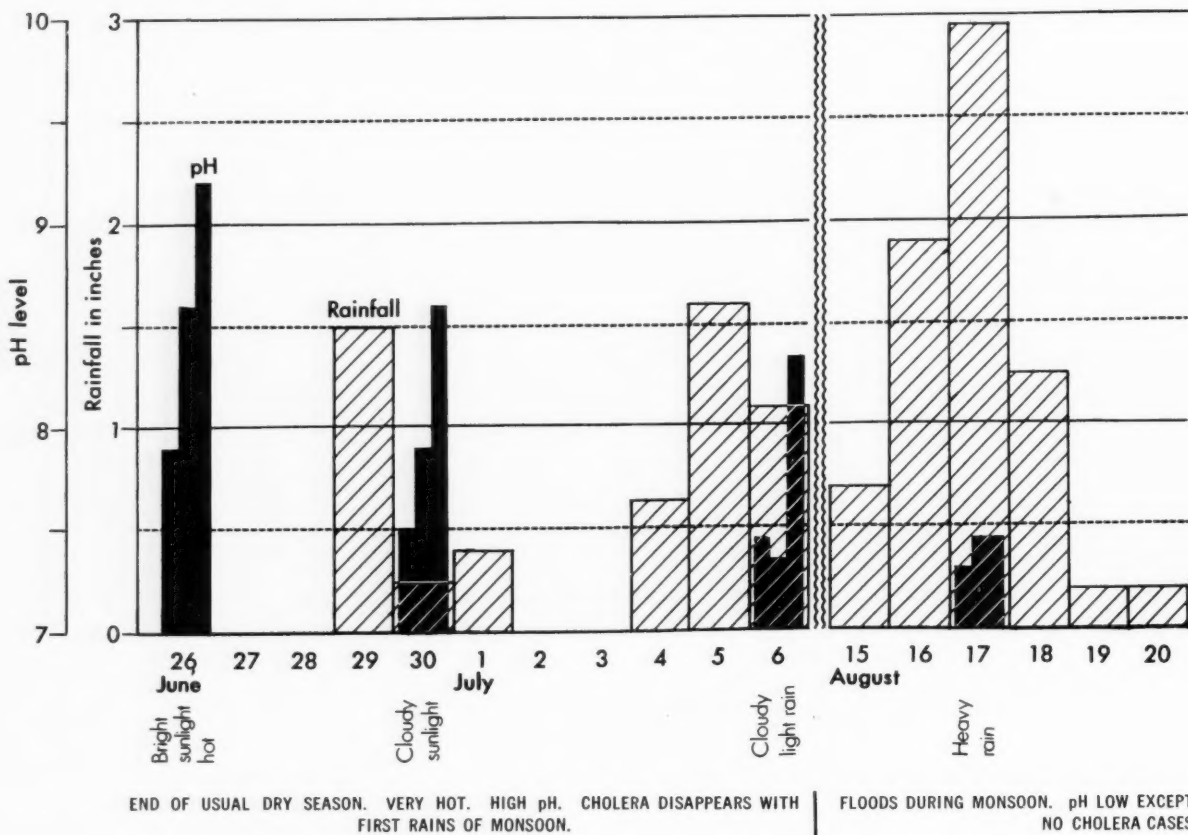
The procedures followed in this laboratory are those of the 10th edition of "Standard Methods for the Examination of Water, Sewage, and Industrial Waste." Precision and accuracy of analytical results are maintained by having each chemist periodically run a quantitative analysis of an unknown synthetic sample. Any errors reported are called to the attention

Table 2. Relationship of pH to the death rate of *Salmonella (Eberthella) typhi* at 20° C

pH	3.8	5.0	5.4	6.4	7.1	7.6	8.7	9.5
Half-life (hours)	0.28	23.0	27.0	21.0	6.8	2.7	1.4	1.0

SOURCE: Reference 4.

Figure 4. Average of the pH levels



of the analyst, and after the cause of the errors has been determined, the previously submitted data are either corrected or discarded. From these continuous checks, it is believed that the reported data are accurate to ± 5 percent of the reported values.

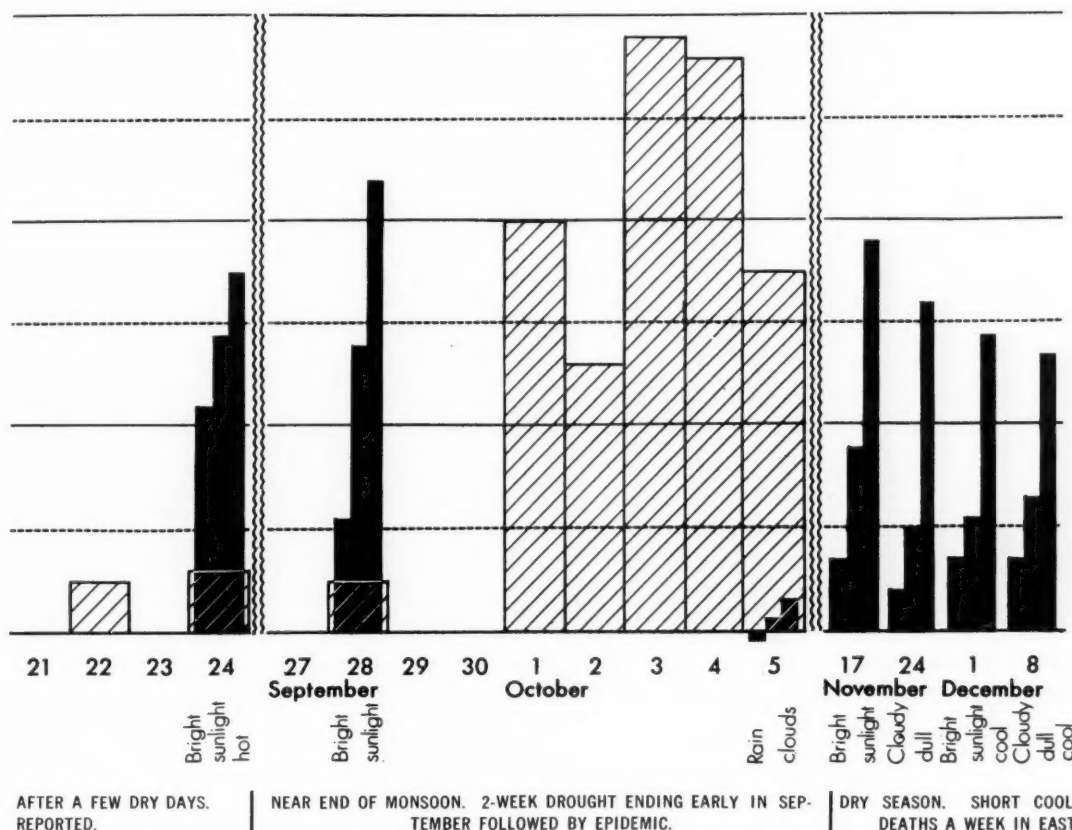
Findings

The year 1959 was atypical so far as the weather was concerned. Normally, there is some light rain in January and severe wind storms with occasional rain in April, but in 1959 heavy showers occurred frequently between January and June. During the monsoon which was expected to start in June, there were often intervals of many days when no rain fell or only a little during the night. The apparent result of the unusual rains was that the anticipated epidemic peak of April and May did not materialize on the usual scale, while perhaps as a result of the light monsoon, the cholera started earlier and more heavily in September with

deaths reaching nearly 1,000 per week. The data are given in figure 2, which shows deaths for the whole Province but the rainfall only for Dacca. The abnormal rainfall also made more difficult the obtaining of clear-cut results with regard to the pH and its relation to sunlight and rainfall.

Samples of the relationship between the pH, the rainfall, sunlight, and time of day at four different periods of the year are given in figures 4 and 5. At sunrise, the pH is usually quite low, being either a little above or below 7.0, but on clear days with bright sunlight it is often above 9.0 by noon, and it can reach as high as 10.5 by late afternoon. A similar daily summer rise in the pH of a springfed pool with abundant *Chara fragilis* was observed in 1928 in the United States (5).

However, when the heavy rain, normal for the monsoon, falls either on the day of sampling or for some days before it, the pH does not rise much above 7.0 and on occasion may fall below it.



In winter, the pH still can rise to high levels but not quite so high as during dry spells in the hot weather. Also the number of hours when this happens is much shorter than in summer when there is no rain. During a long, hot, rainless summer day the pH is above 9.0 for at least 6 hours, but it is at that height for only 4 hours in winter (fig. 5).

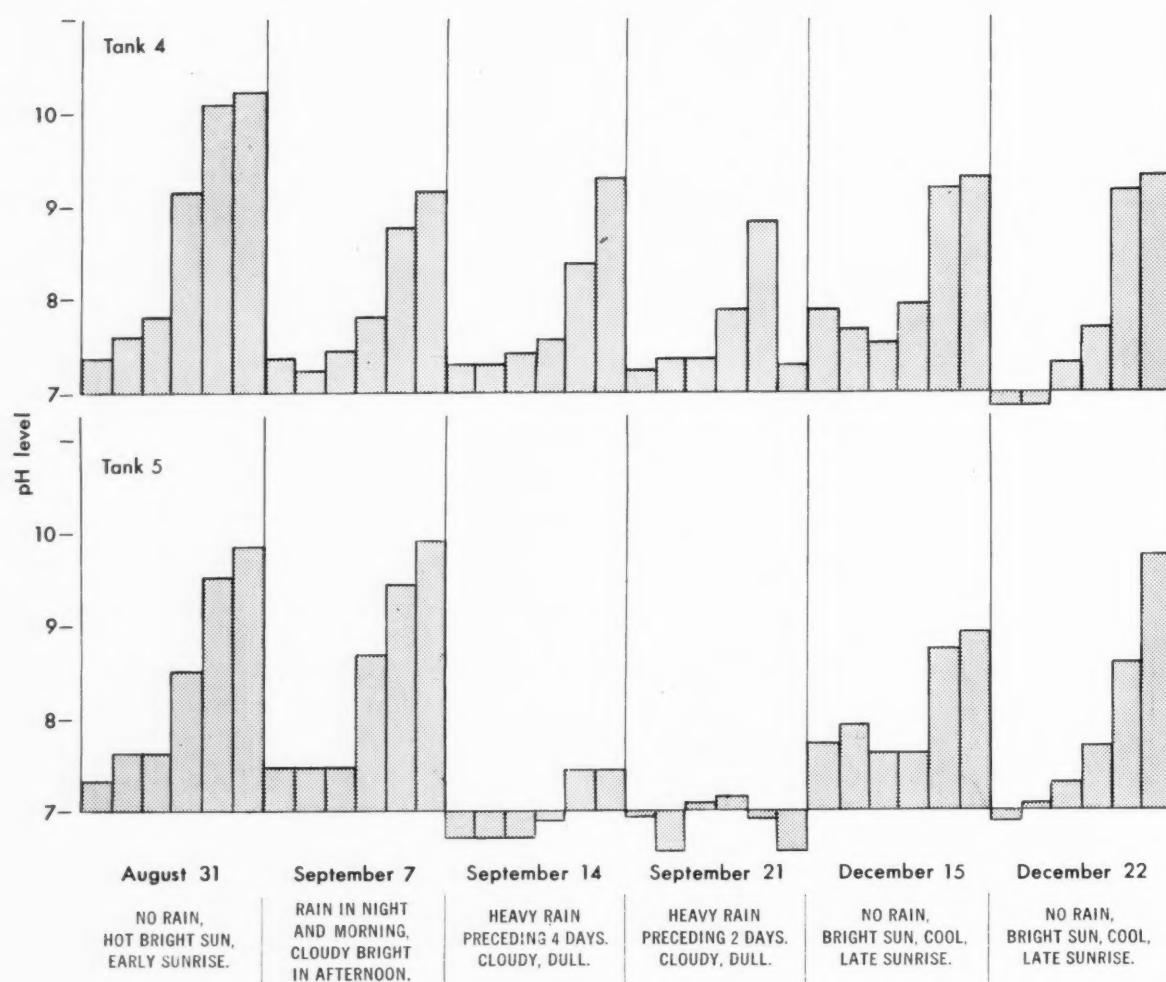
Toward the end of the monsoon in 1959, a sharp epidemic of cholera occurred in Dacca District and in the city itself. It was reported to have started the week ending September 25, but when the time lag in case reporting, which can be as much as 2 weeks, and the incubation period of the disease are taken into account, the date when the population first became generally infected is advanced 2 or 3 weeks to about the beginning of September. This can be related to two comparatively dry, hot, and sunny weeks beginning on August 19, when the pH of the tank water was regularly at a high level for many hours a day. The sunny period was followed by heavy rains, including 5 inches on

September 12, and when the water was tested on September 14, the pH was about 7.0 (fig. 5). The epidemic disappeared soon after, although sporadic cases at the rate of about five or six a day continued to be admitted to the hospital in Dacca.

Observations of tanks in other parts of the endemic area were not so complete as those in Dacca, but, in general, the findings were much the same. All tanks had abundant algae except one near the town of Khulna which did not show a rise in pH. In Khulna District many tanks were surrounded by trees and shaded for most of the day, and they showed little rise in pH above 8.0.

Estimates of chloride content of water showed no differences among the surface water near the sea at Barisal and Khulna, the study area at Dacca, and Rajshahi. In general the ranges were low, between 15 and 30 mg. per liter; tank 3 which had a latrine perched on one side consistently had a content of 50-60 mg. per liter. Other data on the chemistry of the tank water

Figure 5. Studies of the pH in tanks 4 and 5,¹ Dacca, East Pakistan, 1959



¹ Specimens collected at 2-hour intervals starting at 5:30 a.m.

in Dacca are given in table 3. The water is very lightly buffered so that relatively large shifts in the pH can be easily attained. The chloride levels are low, which could be of significance in view of the requirements of the vibrio in culture.

The turbidity is high compared with that of river water. In December when the testing was done there is little flow in the rivers, consequently little mud, and the turbidity is about 30. The difference in turbidity is due almost entirely to the fact that tank water is full of algae and river water is comparatively free of it, which would explain why earlier observers, who tested only river water, failed to find significant pH changes. During the monsoon the river

turbidity due to mud is more than 300. There is no evidence of gross pollution with sewage.

Because the rate of photosynthesis depends on the intensity of sunlight, the rate varies according to the season of the year and the degree of cloudiness. However, experience shows that local factors such as the muddiness of the water, the amount of shade provided by trees and buildings, and the cover provided by water plants on the surface have considerable influence on a particular tank. For example, in most tanks the pH dropped rapidly within half an hour after sunset, but the presence of a two-story house on the west side of a tank would be the equivalent of a half-hour advance in the

Table 3. Chemical analyses in milligrams per liter of tank water in Dacca, East Pakistan

Components analyzed	Tank number and date of sample					
	1 Dec. 28, 1959	2 Dec. 28, 1959	3 Jan. 5, 1960	4 Jan. 5, 1960	5 Jan. 11, 1960	6 Jan. 11, 1960
pH	7.40	7.40	7.25	7.20	7.12	8.05
Total dissolved solids	256	264	366	217	151	148
Turbidity	140	140	50	85	130	37
Total hardness as CaCO ₃	64	42	47	62	50	30
Total alkalinity as CaCO ₃	78	116	56	86	56	72
Ca ⁺⁺	16.0	9.6	9.6	15.2	14.4	8.0
Mg ⁺⁺	4.7	1.9	3.0	4.2	2.4	1.6
Na ⁺	22.4	39.7	15.8	20.4		28.0
K ⁺	16.6	4.8	9.3	11.4	9.8	6.4
Fe ⁺⁺⁺	0.68	1.28	0.6	1.0	0.18	0.30
Mn ⁺⁺⁺	0.00	0.00	0.00	0.00	0.00	0.00
NH ₄ ⁺	0.17	0.03	0.008	0.08	0.05	0.23
CO ₃ ⁻	0.00	0.00	0.00	0.00	0.00	0.00
HCO ₃ ⁻	47.6	70.8	34.2	52.5	34.2	43.9
SO ₄ ⁻	1.8	0.8	11.0	13.0	11.4	11.6
Cl ⁻	33.0	17.2	26.1	34.0	22.7	22.3
NO ₃ ⁻	0.16	0.05	0.42	0.22	0.44	0.44
NO ₂ ⁻	0.11	0.01	0.01	0.13	0.02	0.03
PO ₄ ⁼	0.05	0.04	0.02	0.06	0.34	0.12
F ⁻	0.10	0.05	0.10	Tr.	0.15	0.10
SiO ₂ ⁻	27.2	19.2	7.6	12.1	18.9	13.6
BO ₂ ⁻	6.73	10.3			13.1	4.8

sunset and a shortening by that time period of the pH peak.

In the summer, the days are longer and the period of high pH is also longer. The sun is overhead so that each unit of water surface receives more light than in winter when the sun's rays hit the water at an angle. However, in a normal year the summer also largely coincides with the monsoon when rain reduces the number of sunny hours each day and muddies and dilutes the water in the tanks.

Discussion

Cholera is a disease in retreat. After being spread over nearly all the world in the 19th century, it is now largely pinned down to a small and diminishing portion of southeast Asia. Even here, the trend in the incidence is decidedly downward, as indicated in the yearly figures for East Pakistan (2), and the shrinking of the area where the disease is found all year round. A few decades ago the endemic area included the Rajshahi District; now the area's northern boundary is about 50 miles south. However, cholera is still a serious potential threat to mankind. Deaths at a rate approach-

ing 1,000 a week are reported at certain seasons in East Pakistan, and developments such as fast jet plane travel or the chance of a war in the region might tip the balance once again in favor of the vibrio and result in major epidemics elsewhere. Therefore, it is of importance to know the factors which influence the infection in its original and perhaps only permanent home.

Most studies, even the most recent (6, 7), consider Calcutta to be the main focus of cholera. We suggest that in Bengal the endemic infection is primarily rural, and that the Calcutta urban region is of secondary importance. Many other cities in the world with large populations and overcrowding like Calcutta have experienced cholera epidemics, but in these always the infection has died out. London in the mid-19th century days of John Snow closely resembled Calcutta with its masses of people, insanitary slums, and cholera-infected river, but the vibrio failed to establish a permanent foothold. Calcutta has what the other cities do not have, a surrounding countryside in which cholera always exists.

Of course, the ecology of any infection is a highly complex affair. Variations in three main

factors, the host, the pathogen, and the environment, all must be taken into account. However, there must be something special to account for the persistence of cholera in Bengal when the infection dies out so easily elsewhere. The dominant factor cannot be merely bad hygiene or polluted river water, or the infection would have persisted in many other parts of the world. The investigations reported here were limited to the endemic area of Bengal, so that it is not possible to deduce from the data that the pH of the tank water alone is responsible for the localized endemicity. To test this possibility, similar studies would have to be undertaken in areas in which cholera has never been endemic. The data do allow concluding that the pH is a factor to be taken into account. They also permit theorizing that the pH is responsible for making the tanks the main means of spread of the vibrio and provide an explanation for the connection between the incidence of the disease and the changing climatic conditions.

One can even speculate that the infection evolved in Bengal because of this factor. It is well known that vibrios morphologically similar to the cholera vibrio abound in the water of this region, and it is easy to imagine that the population became parasitized with them through drinking this water. Indeed, a main difficulty in diagnosing sporadic cases of cholera here is that a certain percentage of the population are carriers of vibrios that look like the cholera vibrio but are said to be nonpathogenic. As the population of Bengal increased, especially after the founding of Calcutta, increased passage of these could produce a strain of vibrio pathogenic to man.

If further work should confirm that cholera is endemic in Bengal because of polluted tank water, then the answer to the problem of eradication of the infection lies in the provision of pure water for the villagers. The Government of East Pakistan, with the assistance of the United States through the International Cooperation Administration, is engaged in a program with a goal of 1 tubewell for every 400 people. About 120,000 wells are required. By the end of June 1960, 13,000 new wells were sunk and 12,000 choked-up wells rehabilitated, bringing the total of functioning wells in the Province to about 65,000. A similar program with

the same target, which was set by the Bhore Commission before the partition of India, is underway in the rural areas of West Bengal.

Because of the population distribution, even the achievement of this first target will not bring clean water to every villager. If cholera is to be eradicated, a special effort must be made, particularly in the endemic areas of Bengal on both sides of the border, to provide enough tubewells to reach everyone. International agencies that are interested in wiping out this disease should actively support these efforts of the local governments.

Summary

A theory is presented to explain the long recognized connection between the incidence of cholera and changing weather conditions in Bengal. The theory is that in hot, dry weather algae in the village water tanks raise the pH of the water so high that the cholera vibrio is favored over other organisms.

The potentialities of these ponds of surface water which serve as the village water supply in spreading infection and the ability of the cholera vibrio to withstand a high pH have been noted.

Results of weekly tests of the pH of six tanks for a 1-year period and observations of the relationship of the pH to weather and to incidence indicate that the pH is a factor to be taken into account. It is suggested that the tanks are the chief means for spread of the vibrio and that the endemic infection is primarily rural rather than urban.

Cholera is endemic in Bengal, the major remaining focus of infection, because of polluted drinking water. The eradication of cholera from Bengal, and therefore from the world, depends largely on the success of the Pakistani and Indian Governments in replacing the village tanks with a source of safe water.

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Community Dental Health

Approximately 300 dentists in private practice in Hartford, Conn., were offered an orientation course in the broad concepts of public health and preventive dentistry through a series of lectures and discussions during 1959.

Six basic goals were the main objective of the sponsoring organizations, the Hartford Health Department, Hartford Dental Society, and the Greater Hartford Community Council. These goals were:

1. To acquaint dentists, engaged part time in community dental programs, with the meaning, significance, and goals of public health.

2. To develop the thinking of these clinicians along public health lines and thus aid and interest them in improving their respective programs.

3. To encourage higher standards of clinical dentistry, both in public institutions and in private practice.

4. To create an atmosphere which will encourage community responsibility and community participation in dental public health programs by other private dentists.

5. To promote the concept of preventive dentistry.

6. To aid in bridging the gap between private dental practice and community health programs.

Nine lectures were given by nationally recognized specialists between January and November at 2- to 4-week intervals, with the summer months unscheduled. The 10th meeting was a field trip to the Murry and Leonie Guggenheim Dental Clinic in New York City.

The planning group believed that Hartford dentists, untrained in public health yet giving their time and professional services in order to improve the health of the total community, would benefit from the program, which was made possible by a grant from the Hartford Foundation for Public Giving.

Meetings were held in an informal lounge area of the Hartford Medical Society building. An average lecture, with a social intermission at the halfway mark, lasted from 2 to 3 hours.

The speakers and their subject matter for this series are listed below:

Dimensions of Public Health: Edward G. McGavran, M.D., D.Sc., M.P.H., University of North Carolina.

Planning for Local Community Dental Programs: Carl L. Sebelius, D.D.S., M.P.H., Tennessee Department of Public Health.

Interceptive Orthodontics—Tooth Guidance: John F. Mortell, D.D.S., M.S., University of Michigan.

Methods, Materials, and Motivation in Dental Health Education: Perry Sandell, B.A., M.A., American Dental Association.

Meeting the Dental Needs of the Physically Handicapped and Mentally Retarded: Robert L. Fisher, D.D.S., Long Island College Hospital, and Albert Green, D.D.S., Columbia University.

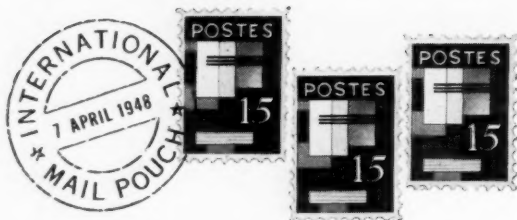
Prevention and Control of Dental and Other Oral Diseases: Robert G. Kesel, D.D.S., M.S., University of Illinois.

More Effective Public Speaking, or Did They Understand What You Said? David C. Philips, M.A., Ph.D., University of Connecticut.

Oral Lesions in Infancy and Childhood: Joseph L. Bernier, M.S., D.D.S., Armed Forces Institute of Pathology.

X-ray Radiation and Its Significance: Leonard F. Menczer, D.D.S., M.P.H., Hartford Health Department.

Additional information, if desired, will be supplied upon request to Dr. Leonard F. Menczer, Hartford Health Department, Hartford, Conn.



Farm Education Improves Public Diet

"For the past 20 years, The Rockefeller Foundation has been working with the Ministry of Agriculture and Animal Husbandry of Mexico. At a cost of something less than \$2 million per year, American agronomists have been supplied to Mexico, and young Mexicans have been trained in the agricultural sciences. In this period, the food production of the country has mounted 80 percent. The gains have been achieved by improved yields of Mexico's own staple crops, the development of new varieties of wheat and potatoes, and the establishment of something like our own county-agent system for farmer education. Not a single tractor or fertilizer plant is in the expense account; the money has been spent for the intangibles of information, education, and expert consultation. The 4 percent per annum gain safely exceeds the 3 percent increase in population and has brought an improvement in the people's diet that is already showing up in the vital statistics."

—From *"The Revolution in Man's Labor,"* a speech delivered by Gerard Piel, April 9, 1959, at St. John's College, Annapolis, Md.

Health Education in Ghana

The health inspectors were chosen to spearhead education for health among the people of Ghana. Inservice courses for selected inspectors were held in each region. The Cocoa Marketing Board provided the funds for the health education project in the Northern Region.

Approximately 50 local health committees in the Eastern, Western, and Volta Regions have been formed as a result of the inspectors' work. The following excerpts from reports indicate the reactions and achievements in the villages.

The Suhum Health Education Committee organized a 1-day school on hygiene for palm wine sellers, chop barkeepers, bread sellers, and wine and

beer barkeepers. The committee has also put up with voluntary labor two urinals for patrons of some nearby palm wine bars. Members of the committee gave talks in schools and churches and at village gatherings.

The Diase Health Education Committee has a bilharzia education program in progress. People make less use of river water. Weeds on the outskirts of town have been cleared by the committee through communal labor.

The Bogoso School Health Committee conducted a group discussion on the health of the school child. A large number of parents were present. "Keep Bogo Clean" was the theme for a health week with parents, teachers, and children participating in cleaning homes and the town.

Sakai, Tumu District, is a village of about 600. Its people have a reputation for their stubbornness, but they pledged full support to the health committee.

Pregnant women and children under 5 years were registered. Weekly child welfare clinics were started and have been heavily patronized. Bathing of children has become competitive.

The people weeded and swept the entire village and built 12 pit latrines. "The spirit of cooperation and self-help had strongly seized the hearts of every member of the village. . . ."

In Bongo, Bolgatanga District, we were able to form a women's health committee. The women meet every Monday to discuss matters of interest and have asked for more demonstrations about bathing the baby and the preparation of orange squash. The committee members divided themselves into groups, and they visit pregnant women and the sick to advise them to go to the hospital.

Before our arrival in Sekoiega, Yendi District, there was not a single latrine. For this reason, we tackled the construction of pit latrines the second week. The people built seven pit latrines, which are fairly distributed over the village.

Most of the mothers have begun to give the babies boiled water and fruit juices. Most of them do not add eggs to kako, a type of porridge. The general reason given is lack of means.

The people feel the dire need for a dam; they have pledged to contribute manual labor to any scheme to materialize the construction of a dam.

—JEAN M. PINDER, health education adviser, U.S. Operations Mission, Ghana.

Evaluation of Tuberculosis Casefinding by Mass Small Film Radiography

ANDREW C. FLECK, M.D., HERMAN E. HILLEBOE, M.D., and GEORGE E. SMITH, Jr., M.A.

EVALUATION, by definition, is the process of determining value. Value is a concept that expresses a relationship between expenditure and benefit. In a proposed or actual public health program, benefits are either stated or implied in documents submitted to appropriating bodies or budget directors as justification for expenditures.

There is no theoretical approach to evaluation; it is entirely an empirical process. To evaluate a proposed program and appraise its potential for good or ill, the evaluator has only the past experience of others with which to work. If a program is already operating, the evaluator can draw also from current experiences.

None may argue safely that a program's benefits are too intangible for measurement. Public health programs—indeed all human effort—are in constant danger of becoming pointless exercises in movement unless there is constantly available some method of accurately expressing the relationship of cost to benefit.

This paper reports the results of an evaluation of the radiographic survey tuberculosis casefinding program of the New York State Department of Health in upstate New York. The program was begun in 1948, but, because records for the years 1948–51 were not readily available, results for the years 1952–58 only have been used. To obtain maximum ob-

jectivity, this evaluation was made by the executive office of the health department and not by the program's operating staff.

The Program

Two casefinding methods have been used since the start of the program in 1948, general community surveys and general hospital admissions.

General Community Surveys

Community chest X-ray surveys are initiated by application of a full-time local health officer, who first determines the need for the survey and takes the necessary steps to organize the community. This preliminary work may or may not have the assistance of other official and voluntary agencies. The tuberculosis casefinding bureau of the State health department assigns priorities in the order in which applications for surveys are received.

The casefinding bureau has seven transportable X-ray machines, which take miniature 70-mm. chest X-rays. The bureau provides films, chemicals, and special records. Films are interpreted by chest experts. Five of the machines are in mobile buses. Specially trained photo-fluorographers operate these units and process the film.

General Hospital Admissions

The second casefinding method is the X-raying of all adults admitted to participating general hospitals. Any nonprofit general hospital with 4,000 or more admissions a year is eligible to enter this program. Ninety-six of the 187 eligible hospitals in upstate New York were

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participating in the hospital survey program by the end of 1958.

The tuberculosis casefinding bureau loans photoroentgen equipment to hospitals for this activity. Each hospital submits routine chest X-ray reports to the bureau, which pays the hospital 50 cents for each report. Hospitals with less than 4,000 admissions a year may enter the program by agreeing to use their own equipment to take standard 14- by 17-inch X-ray films; these hospitals are paid \$1 for each report.

With both the community survey and general hospital methods, a clinical followup of initial findings is undertaken by the health department, and a "followup" diagnosis is submitted to the State health department by the hospital within 6 months after completion of the survey.

Central Office X-ray Unit

The bureau of tuberculosis casefinding supervises an X-ray unit located in the central office of the health department. This unit takes X-rays of newly hired State employees in Albany, develops all films taken by the mobile units, and performs other assigned tasks.

Evaluation Method

The evaluation study was started by identifying the possible benefits and the epidemiological basis for the health department's tuberculosis program. These were either implied or stated in documents such as the existing program plan, budget justifications, and pertinent legislative enactments.

Epidemiological Assumptions

The mass survey method has utility as a screening device in a normal population only if the following assumptions are true:

- That pulmonary tuberculosis is frequently an unsuspected disease.
- That persons with unsuspected pulmonary tuberculosis constitute a hazard to themselves and an actual or potential hazard to others.
- That tuberculosis suspects found by radiographic screening of a population will receive followup diagnostic study so that true cases will be identified.

These assumptions were accepted by the eval-

uator. However, if the mass radiographic casefinding programs are found to be not productive, it may be because one or all of these assumptions are not true.

Program Plan

The program plan divides tuberculosis control into three activities: casefinding, isolation, and treatment. These activities derive from three epidemiological conclusions:

- Tuberculosis is an infectious disease caused by a specific agent, the tubercle bacillus.
- Tuberculosis is spread from person to person by exhalation of the specific agent by a person with pulmonary tuberculosis and inhalation of the agent by a susceptible person.
- The most effective control is achieved by containing tubercle bacilli in or eliminating them from persons with pulmonary disease.

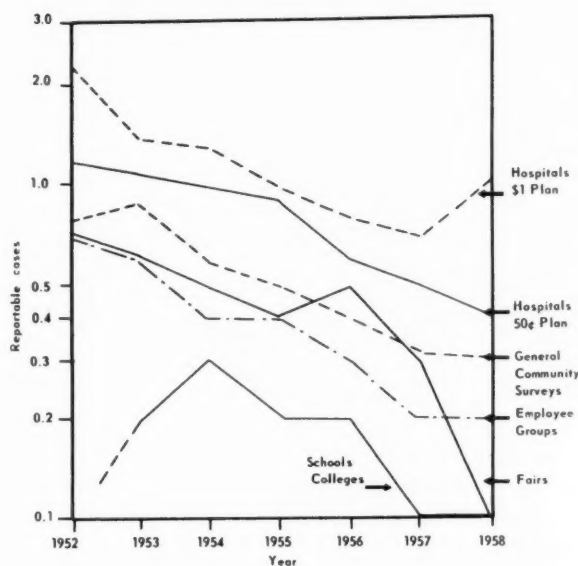
In this evaluation, we did not critically examine these conclusions but accepted them as being in accord with what is presently known about the epidemiology of tuberculosis. They may or may not be true. Each evaluation process must identify these fundamental conclusions so that they are available for review by the executive who is to use the study as a basis for making decisions.

Program Objectives

Epidemiologically, the objective of the tuberculosis casefinding program is the discovery of unreported potentially communicable cases of tuberculosis. This objective is so stated in the program plan. However, casefinding activity bestows no benefit unless the other elements of tuberculosis control— isolation and treatment—are satisfied. For this reason, the contribution of a casefinding activity to the ultimate goal of tuberculosis control cannot be evaluated by examination of the casefinding function alone. Nevertheless, the extent to which mass radiographic surveys contribute to the subordinate goal of casefinding can be determined and evaluated.

The establishment of a casefinding program requires that all casefinding methods in use be considered. When funds are short, the spending of money for mass radiographic surveys implies that other casefinding methods have been rejected. It also implies that the mass survey

Annual number of tuberculosis cases per 1,000 films taken in a mass X-ray survey in upstate New York, 1952-58



is either more efficient than other methods or is the best method of finding a particular class of cases. Discovery of an unsuspected class of cases dictated the selection of mass radiography as a casefinding technique in upstate New York. Other methods of casefinding are directed at suspect persons who either are known to have been exposed to tuberculosis or show evidence of infection or disease.

Measurement Indices

The ultimate objective of mass radiographic casefinding is to discover unknown potentially communicable cases of tuberculosis. Since tuberculosis is a communicable disease and one unknown case may spread the disease to many persons, it is desirable to discover all cases. In practice, however, results must justify effort in terms of total department funds available for all health services. For this reason, the number of cases found is, alone, an inadequate measure of the extent to which the objective is being attained. Results must therefore be measured in terms of cases found per unit of effort.

Before we could determine the number of cases found, it was necessary to define a "case." A case of tuberculosis found on mass survey was defined as one previously unreported and clinically diagnosed 6 months following X-ray as active, activity undetermined (probably ac-

tive), reportable pleural effusion, or active extrapulmonary tuberculosis. These terms are defined in Diagnostic Standards of the New York State Department of Health and are based on diagnostic standards and classification of tuberculosis promulgated by the National Tuberculosis Association, 1957.

When the evaluation started, only the initial screening film results were routinely reported to the State health department. These findings were classified as probably active, probably inactive, suspect tuberculosis, or negative. Preliminary casefinding yields reflected only the number of probably active cases (by X-ray film diagnosis only) per 1,000 films. Early in the evaluation it became apparent that this was not a valid measure of the number of previously unknown active or communicable cases of tuberculosis being found.

Using the clinical diagnosis established at the end of 6 months' followup as the standard for a true previously unknown active or communicable case of tuberculosis, the specificity of the initial finding "probably active" was found to be only 25 percent, and its sensitivity 53 percent (1). "Specificity" is a measure of the probability of a correct positive diagnosis; "sensitivity," of the probability of a correct negative diagnosis. In calculating the sensitivity index, it was assumed that there were no positives in the group classified as negative on initial screening. This, of course, is highly improbable (2). The specificity of initial findings varied from survey to survey.

Evaluation should serve as a tool to measure not only the extent to which the predetermined epidemiological objectives are being met, but also to the extent to which fiscal forecasts are being complied with. Therefore, a critical index of performance is the cost per unit of result "because programs all depend upon money for their continued operation" (3). The most successful casefinding plan will uncover the largest number of previously unknown cases of tuberculosis per unit of effort. One direct measure of effort is the number of dollars spent. Since budgeting is carried out in a dollar context, we selected as the index of effort expended the number of dollars spent by the official agency. We then related casefinding results to dollars spent. This method also provides a future basis

Table 1. Yield of previously unknown cases of active tuberculosis and variable cost per case found, 1952-58

Year	Number films taken	Active cases found		Variable cost	
		Number	Number per 1,000 films	Total	Per case
1952	388,012	454	1.2	\$223,332	\$492
1953	388,408	385	1.0	227,668	591
1954	522,914	414	.8	239,077	577
1955	496,144	345	.7	258,250	749
1956	498,256	260	.5	264,187	1,016
1957	519,627	223	.4	272,304	1,221
1958	432,241	187	.4	269,513	1,441

for comparing tuberculosis casefinding performance with other governmental health activities.

Any method of calculating the cost of finding a new case of tuberculosis must provide information which will enable us to decide whether or not there is a proper balance between results and cost. This consideration applies both to the screening program as a whole and to individual surveys within that program. We, therefore, used a cost index which would show the yield of new cases found per 1,000 films.

The first step in calculating the cost index was to determine the annual variable, fixed, and total costs incurred in each casefinding method. The criteria for identifying fixed and variable costs have been described elsewhere (4).

Briefly, fixed costs are those which are unrelated to the volume of screening activity, such as equipment, and variable costs are those which reflect the volume of screening activity, such as X-ray film.

The second step in calculating the cost index was to determine the number of films taken in each survey, the total films taken during the year, and the corresponding numbers of newly discovered cases.

The computation was carried out by multiplying the number of films taken in a survey by the average variable cost of taking one film that year and dividing the product by the number of cases found by the survey being examined:

$$\text{Cost index} = \frac{\text{Number films} \times \text{average cost per film}}{\text{Number new cases found}}$$

Results

Table 1 shows the number of previously unknown cases of tuberculosis found and the cost per case for each survey year. The number of cases found dropped from 454 in 1952 to 187 in 1958. During this 7-year period, the average variable cost of finding a previously unknown case increased from \$492 to \$1,441. This was primarily the result of declining yields, the variable cost factor being relatively stable.

Table 2 shows the annual variable cost—total and per X-ray—for the community and hospital admission survey programs for the period 1952-58.

Table 2. Total variable costs and variable costs per film, mass radiographic survey program, upstate New York, 1952-58

Year	General community surveys		Hospital admission surveys			
			Large hospital program		Small hospital program	
	Total variable cost	Variable cost per film	Total variable cost	Variable cost per film	Total variable cost	Variable cost per film
1952	\$94,213	\$0.53	\$110,222	\$0.50	\$18,897	\$1.00
1953	93,147	.63	106,530	.50	27,991	1.00
1954	93,148	.35	110,894	.50	35,035	1.00
1955	100,856	.45	116,440	.50	40,955	1.00
1956	103,047	.48	120,612	.50	40,528	1.00
1957	110,421	.47	120,410	.50	41,473	1.00
1958	117,320	.69	109,741	.50	42,452	1.00

The average cost figures masked considerable variations in performance; these became apparent when one type of survey was compared with the others.

Various specific rates were applied to delineate further the differences in results of the various types of surveys used in the program. However, specific rates were compiled for such factors as the "captive" or "voluntary" character of the groups screened, the population size of the incorporated area in which a survey was held, and the form of local health administration requesting and selecting the area to be

surveyed. This was done to determine whether any association could be found between the factors involved and higher casefinding yields. Such associations could then be translated into concrete administrative recommendations. However, the interpretation of such associations still requires that the facts be related to the whole theory of the natural history of the disease.

Table 3 and the chart present a summary of the findings classified by type of population surveyed.

Surveys of school and college groups have

Table 3. Number of new cases of tuberculosis found, number per 1,000 X-ray films taken, and variable cost per case, by type of population screened, upstate New York mass radiographic casefinding program, 1952-58

Year	General population			Agricultural fairs			Schools and colleges		
	Cases found		Cost per case	Cases found		Cost per case	Cases found		Cost per case
	Number	Rate per 1,000 films		Number	Rate per 1,000 films		Number	Rate per 1,000 films	
1952	110	0.8	\$663	6	0.7	\$745	0	0.0	(1)
1953	95	.9	741	4	.6	979	2	.2	\$4,161
1954	110	.6	610	6	.5	667	3	.3	1,308
1955	85	.5	915	4	.4	1,043	3	.2	1,881
1956	70	.4	1,279	4	.5	935	2	.2	3,090
1957	46	.3	1,359	2	.3	1,642	1	.1	5,943
1958	37	.3	2,189	1	.1	4,652	1	.1	6,552
Total	553	.5	939	27	.5	1,043	12	.2	3,275
	Employees			General hospital admissions					
				Large hospitals			Small hospitals		
	Cases found		Cost per case	Cases found		Cost per case	Cases found		Cost per case
	Number	Rate per 1,000 films		Number	Rate per 1,000 films		Number	Rate per 1,000 films	
1952	16	0.7	\$815	277	1.2	\$397	45	2.4	\$420
1953	10	.6	1,079	236	1.1	450	38	1.4	737
1954	22	.4	820	228	1.0	486	45	1.3	779
1955	11	.4	1,185	201	.9	579	41	1.0	1,000
1956	2	.3	1,856	149	.6	809	33	.8	1,228
1957	21	.2	1,837	129	.5	933	24	.6	1,728
1958	8	.2	3,118	99	.4	1,108	41	1.0	965
Total	90	.4	1,369	1,319	.8	602	267	1.1	926

¹ \$3,961 expended, no cases found.

Table 4. Number of new cases of tuberculosis found and rate per 1,000 films taken in surveys of New York State employees, by place of employment, 1952-58

Year	Place of employment					
	New York City			Upstate New York		
	Number films taken	Cases found		Number films taken	Cases found	
		Number	Rate per 1,000 films		Number	Rate per 1,000 films
1952				9,787	3	0.3
1953	8,924	13	1.4	7,313	2	.3
1954				270	1	3.7
1955				10,056	1	.1
1956	8,963	7	.8	2,545	0	.0
1957						
1958				10,276	0	.0
Total	17,887	20	1.1	40,247	7	0.2

been the least productive. In the 7 years of the survey, 79,076 films yielded only 12 new cases of tuberculosis at an average cost of \$3,275 per new case found.

Declining yields were obtained in surveys of the general population, agricultural fair goers, and employee groups. The 1958 cost of \$2,189 to \$4,652 for each case found in these groups suggests that more productive results could be obtained if greater care were taken in selecting

population groups to be surveyed. This statement has special significance wherever funds for tuberculosis control are limited.

Further exploration for high-yield subgroups within the school and fair populations is impossible because of the small size of the groups available for study and their relative homogeneity. As a consequence, when funds are limited further surveys of such populations must be labeled as unproductive.

The cost of finding a case of tuberculosis by surveying hospital admissions, employee groups, and general populations might be lowered if subgroups with higher yields could be identified. One promising clue to a high-yield group was uncovered when results of surveys of State employees located in New York City were compared with results of surveys of State employees in upstate urban areas. Table 4 shows that the yields in New York City were significantly higher, suggesting that the greater the degree of urbanization, the greater the yield of tuberculosis cases.

A similar analysis of surveys of other employee groups and general populations showed that higher yields are characteristic of both general and employee population surveys in incorporated areas of 80,000 or greater population (table 5). This higher yield was not the result of greater survey activity in urban areas in the earlier years when surveys were more productive, because the difference still exists in

Table 5. Casefinding yields per 1,000 films in employee and general population surveys, upstate New York, by population of incorporated area, 1952-58 and 1957-58

Population	1952-58 ¹						1957-58					
	General population			Employee groups			General population			Employee groups		
	Number films taken	Cases found		Num- ber films taken	Cases found		Num- ber films taken	Cases found		Num- ber films taken	Cases found	
		Num- ber	Rate per 1,000 films		Num- ber	Rate per 1,000 films		Num- ber	Rate per 1,000 films		Num- ber	Rate per 1,000 films
80,000 and over	62,267	53	0.9	70,636	43	0.6	16,499	11	0.7	37,153	12	0.3
20,000-79,000	341,736	170	.5	56,756	15	.3	59,486	22	.4	29,796	4	.1
Under 20,000	644,901	330	.5	80,418	25	.3	176,287	50	.3	42,009	13	.3
Total	1,048,904	553	.5	207,810	83	.4	252,272	83	.3	108,958	29	.3

¹ Exclusive of State employee surveys.

Table 6. Casefinding yields in three general hospitals with separate tuberculosis service, 1952-58

Year	Number X-rays taken	Number cases found	Yield per 1,000 films
1952	24,016	44	1.8
1953	25,482	51	2.0
1954	24,529	47	1.9
1955	26,372	66	2.5
1956	26,057	46	1.8
1957	24,478	46	1.9
1958	21,646	35	1.6

the yield data for 1957-58. The yields are, however, lower in all population size classes, an effect of the yearly decrease in number of cases found. There was no observable difference in yield between the 20,000 to 79,000 population class and areas of less than 20,000 population (table 5).

The screening of hospital admissions showed the same association between population and yields of tuberculosis cases as analysis of re-

sults of surveys of other groups. Large hospitals located in incorporated areas of 80,000 or greater population gave consistently higher yields. Three hospitals in metropolitan areas gave sustained yields of 2 new cases per 1,000 X-rays. All three hospitals had wards devoted to the care of tuberculosis patients. Although screening films were not taken on persons admitted to the tuberculosis service, it was felt that there might be a tendency by physicians in these hospitals to admit tuberculosis suspects to the general wards. Therefore, these three hospitals were treated separately (table 6).

Table 7 shows the yields of tuberculosis cases for each population size class for hospitals participating in the program, exclusive of the three with tuberculosis wards. Casefinding was twice as productive in cities of 80,000 or over population as in areas with less than 20,000 population. The smaller hospitals, those participating in the \$1 reimbursement program, showed the same association between urban location and higher yield of cases (table 7).

Other factors explored were the type of local

Table 7. Casefinding results for two hospital reimbursement programs, by population of incorporated area of hospital location

Year	Population								
	80,000 and over			20,000-79,000			Under 20,000		
	Number films taken	Cases found		Number films taken	Cases found		Number films taken	Cases found	
		Number	Rate per 1,000 films		Number	Rate per 1,000 films		Number	Rate per 1,000 films
50-cent reimbursement program, 1952-58 ¹									
1952	120,752	152	1.3	40,599	43	1.1	35,078	38	1.9
1953	109,167	122	1.1	45,596	29	.6	32,815	34	1.0
1954	104,780	103	1.0	54,166	42	.8	38,313	36	.9
1955	115,892	91	.8	50,997	31	.6	39,617	13	.3
1956	115,457	70	.6	55,520	12	.2	44,191	21	.5
1957	115,729	61	.5	49,417	11	.2	51,197	11	.2
1958	101,092	37	.4	62,596	19	.3	34,149	8	.2
\$1 reimbursement program, 1957-58									
1957	3,238	7	2.2	18,034	9	.5	20,201	8	.4
1958	2,900	9	3.2	9,635	5	.5	26,283	27	1.0

¹ Does not include 3 general hospitals with specialized facilities for the care of pulmonary tuberculosis.

health organization initiating and planning the surveys, the frequency with which areas were surveyed, and the age distribution of the cases found. Only the last analysis provided information of administrative value. The existing policy arbitrarily called for the screening of all persons 15 years of age or older. Data from the hospital admission programs showed that X-ray films on persons over age 25 would be significantly more productive. In 1958 the yield of cases for males aged 15-24 was 0.2 per 1,000 (9,050 films) and for males aged 25-34 was 1.0 per 1,000 (11,510 films). The corresponding yield for females aged 15-24 was 0.1 per 1,000 (45,198 films), and for those aged 25-34, 0.3 per 1,000 (50,961 films).

Use of Data by Administrator

The data on radiographic screening experience were collated to develop a system which could be used to predict the most worthwhile future activities in tuberculosis casefinding. Data were analyzed from a series of surveys similar to those which would ordinarily be contemplated for the future. These data provide a measure of the probability of finding cases of tuberculosis by each class of survey and can be used to predict trends and yields (5).

The trend data tell us that a continuation of the program in its present form will probably result in a casefinding yield of less than 0.3 cases per 1,000 films. Considered in the context of the dollar value of the mass X-ray screening system, such a prediction can be considered as an indication for discontinuance of much of the program. However, to make this decision, one must know how many cases can be found by some alternative method for an equivalent expenditure of funds. Such knowledge is not available as a result of this evaluation, and we cannot logically make such a decision (5).

The study also predicts that, if we confine our survey activity to incorporated areas of over 80,000 population and discontinue surveys of persons under age 25, school populations, and upstate State employees in all areas, the resulting higher yield will be about 0.5 cases per 1,000 population. The development and use of such a predicting system require regular re-

Table 8. Percentage of unknown cases of tuberculosis found by various casefinding methods, upstate New York, 1958

Method	New cases	
	Number	Percent of total cases
Hospital admission X-rays.....	140	7.0
Community surveys.....	47	2.4
Other methods.....	1,649	83.6
Reported at time of death.....	136	7.0
Total.....	1,972	100.0

porting of results and costs. By comparing our predictions with observed results we will be able to check the validity of the predicting system.

The results of the predicting system developed by the evaluation study were presented to the State health officer, who is responsible for making decisions. It was at this level that the evaluation process was completed.

The State health officer reviewed the theoretical basis for the program as stated in the report. He also considered the soundness of the view that tuberculosis is spread on an exogenous basis. He next considered the findings of the probability predicting system in view of his own individual value system. He gave the program operator full opportunity to discuss the results of the study and then made the following decisions, in accordance with the predicting system findings available at this particular time and place:

- Surveys of students, upstate State employees, persons residing in areas with less than 20,000 population, and persons under age 25 will be discontinued.
- Some photofluorographers and equipment no longer needed to carry on the program will be discontinued or shifted to other public health programs.
- Surveys in areas of over 80,000 population are to be intensified.
- A reporting system using valid measures of achievement will be inaugurated to measure future progress.

These decisions were wholly acceptable to the tuberculosis program directors.

The following decisions were made contrary

to the findings of the predicting system, presumably on the basis of other values foreign to the casefinding objective. The apparent reason for each decision is given in parentheses.

- Surveys of persons at the State fair will continue (for publicity purposes, not case-finding).

- School teachers will continue to be surveyed regardless of higher cost and because of legal responsibility (policy of the State education department that this be provided as a service).

- The central office X-ray equipment used primarily for the examination of upstate State employees is to be retained (equipment needed in part to process survey films and for demonstration and experimental purposes).

Just as the decisions made as a result of the evaluation study are influenced by other values, the interpretation of the evaluation results is influenced by other sources of pertinent information. The best illustration of this is the realization that the radiographic casefinding program uncovered only 187 cases of tuberculosis in 1958 at a cost of \$269,513. The total number of new cases of tuberculosis in the same year was 1,972. This means that the program being evaluated found less than 10 percent of the total cases. In comparison, 136 cases were reported for the first time at the time of death (table 8).

Summary

Evaluation of a public health program requires that a predicting system be devised and made a continuing part of the program. The

application of such a system to a tuberculosis casefinding program in upstate New York produced the information that yields of cases found by mass X-ray surveys are low and will continue to decline.

No decision could be made on the basis of the dollar value of the mass X-ray screening system unless a similar study were made of all other casefinding methods. Adjustments were made within the program on the basis of the associative predictions and upon an unquantitated value system characteristic of the New York State Department of Health.

Less than 10 percent of all new cases of tuberculosis discovered in 1958 were found by the radiographic screening method at an average variable cost of \$1,441 per case found.

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Smith Appointed Assistant Surgeon General

Dr. Clarence A. Smith became chief of the Communicable Disease Center, Atlanta, Ga., July 1, 1960, with the rank of Assistant Surgeon General. The deputy chief of the center since 1957, Dr. Smith succeeds Dr. R. J. Anderson, who has been appointed deputy chief of the Bureau of State Services, Public Health Service.

An officer in the commissioned corps of the Public Health Service since 1937, Dr. Smith became assistant chief and chief of the Service's Venereal Disease Control Division in Washington after serving as venereal disease control officer in Chicago.

films

Public Health Nursing In Communicable Disease Control

35-mm. filmstrip, color, silent, with printed guide, 49 frames, cleared for television, 1960. (Order No. F-417.)

Audience: Graduate nurses.

The role of the public health nurse in the control of communicable diseases is explained. Her activities and responsibilities to the patient, family, community, physician, public health agency, and to herself are depicted.

How To Observe Nursing Activities

16-mm. filmgraph, black and white, sound: part 1, 14 minutes, 12 seconds, 512 feet; part 2, 9 minutes, 43 seconds, 350 feet; 1960, cleared for television. (Order No. FG-315.)

Audience: Personnel in hospital nursing services and schools of nursing.



For use as an aid in planning nursing activity observation, this two-part film is based on and is to be used in conjunction with an accompanying manual "How to Observe Nursing Activities in a Patient Unit."

The film is divided for the convenience of the instructor in scheduling planning sessions. Part 1 describes a nursing activities study and explains how any nurse may be trained to observe these activities. Part 2 illustrates those services which are difficult to identify because their purpose is not apparent.

Listeriosis

35-mm. filmstrip, color, silent, with printed guide and text, 45 frames, 1960, not cleared for television. (Order No. F-399.)

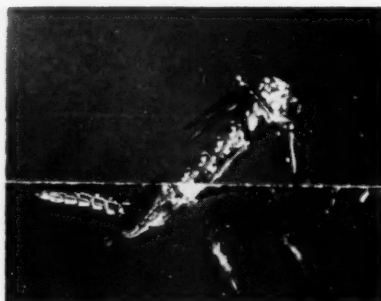
Audience: Physicians, veterinarians, and medical bacteriologists.

This filmstrip is a resume of the diagnostic characteristics of listeriosis from a clinical and bacteriological viewpoint. The text includes a description of the ecology and therapy of the disease in man and animals.

Biology and Control of Domestic Mosquitoes

16-mm. motion picture, color, sound, 21 minutes, 782 feet, cleared for television, 1960. (Order No. M-357.)

Audience: Public health personnel engaged in vector control, students of public health, municipal and local public health officials, civic and service groups, and television audiences.



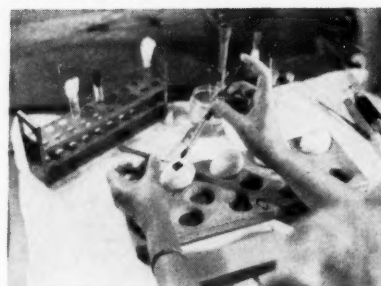
This film is designed to train public health personnel and students as well as to induce the cooperation of individuals and organized groups of persons in the control of domestic mosquitoes.

Techniques of Laboratory Diagnosis of Influenza

16-mm. motion picture, black and white, 17 minutes, 600 feet, 1960, cleared for television. (Order No. M-368.)

Audience: Laboratory technicians.

A revision of "The Laboratory Diagnosis of Influenza," this film explains and demonstrates the procedures step by step which are now recommended for the laboratory diagnosis of influenza. Included are the collection of specimens, isolation

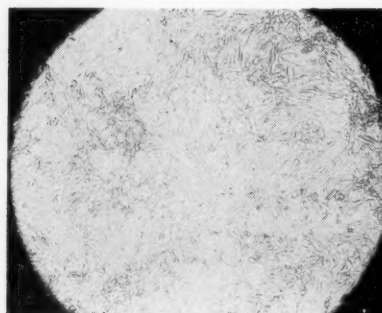


of the virus by intra-amniotic inoculation of chick embryos, rough agglutination tests, titration, hemagglutination tests, and establishment of antibody content.

Introduction to Tissue Culture Techniques

35-mm. filmstrip, color, sound, 51 frames, 8 minutes, cleared for television, 1960. (Order No. F-388.)

Audience: Laboratory directors and advanced laboratory technicians.



An introduction to laboratory practice in the techniques, this filmstrip demonstrates, step by step, the procedures in producing and maintaining a tissue culture, using monkey kidney tissue as an example. The uses of tissue culture are summarized briefly.

These films are available on short-term loan, United States only, from the Communicable Disease Center, Atlanta 22, Ga., Attention: Audio-visual. They can be purchased from United World Films, Inc., 1445 Park Avenue, New York 29, N.Y.

MICROBIOLOGICAL STANDARDS FOR FOODS

Microbiological testing for pathogens and indicator micro-organisms in food, in the factory, on the farm, or at the market, is only one phase of the process of preventing food poisoning. Useful and important in themselves, tests for microbial content of foods are futile if they are not accompanied by sanitation, adequate reporting and investigation, and public education. Microbiological standards for food, be they official, voluntary, or administrative, have been effective in promoting sanitation in many phases of the food industry. Nevertheless, there is a need for research, aimed at especially suspect foods, directed to specific organisms, processes, and stages of production, so as to develop defensible, attainable, and desirable standards, testing methods, and tolerances under authoritative auspices, as a guide to industry and as a protection for the consumer.

• • •

These comments were typical of the statements expressed by distinguished scientists, representing research institutions, regulatory agencies, and food industries of North America and Europe, at a conference on microbiological standards for foods, June 8-9, 1960, Washington, D.C., called by the Division of Medical Sciences of the National Academy of Sciences-National Research Council. The division's committee on sanitary engineering and environment joined forces with its committee on medical microbiology to organize the meeting, under the chairmanship of Prof. Walter D. Tiedeman,

resident lecturer at the University of Michigan, in association with Dr. Morris Shiffman, Department of Public Health, Philadelphia.

The conferees unanimously recommended that the NAS-NRC explore ways and means of furthering objectives on which the session was agreed.

The conference addressed itself to five questions posed by the chairman:

1. Are microbiological standards for foods necessary and desirable?
2. To what classes of food products should standards be applied?
3. What microbiological tests are applicable to foods?
4. How should limits be determined?
5. What practical results may be expected from the application of reasonable microbiological standards?

Along with the discussion of these issues, the conferees heard and participated in a series of auxiliary discussions so comprehensive that some excursion into questions of nutrition, palatability, spoilage, and chemical contamination was unavoidable.

The Issues

1. The necessity and desirability of microbiological standards proved to be beyond debate. It was agreed that some standards of microbiological quality are always implicit. It was agreed that explicit standards generally have

had desirable effects, although specific standards are not always appropriate.

To develop and define standard limits, methods, and procedures, all considered to be desirable, the conferees urged considerable further education, study, and experience. They asserted there is an obvious need to build upon current standards. Food plant inspection was agreed to be a necessary and important phase of administering standards.

2. Classification of food products for application of standards was found to depend on a variety of factors. The ingredients and method of preparation, according to one system of classification, would emphasize the possibilities of contamination. Another factor in classification is experience with foods which have demonstrated a considerable hazard and which are amenable to regulation. It was agreed that an obligation rested with regulatory authorities to deal with immediate and obvious challenges presented by experience. The discussion brought out that few foods are completely secure from hazards in all circumstances.

3. The most earnest discussion as to the selection of microbiological tests concerned use of the coliform count. The experience of New York City suggested that this test was not any more effective as an indicator of contamination than the standard plate count, when such counts were high. Others proposed that a test for *Escherichia coli* be applied, as a more certain indicator of the presence and growth of enteric pathogens, when standard plate counts are low.

A single standard test for all foods had no champions. Although the standard plate count was agreed to have practical value as a measure of microbiological growth, it was agreed that the variety of foods, sampling methods, processes, and flora, and the possible presence of toxins without organisms, required a selection of tests and standards appropriate to the hazards.

4. The conferees discussed methods of determining limits as a critical challenge. Arbitrary official limits, while effective, were felt by several to pose an occasionally unreasonable threat to commerce. The zero requirements for coliforms in frozen foods was asserted to be impractical. It was agreed that there was far too little epidemiological knowledge at present on which

to base precise limits in all circumstances. By implication, empirical limits, set administratively rather than legally, with the support of continuing studies, seemed to be a favored course. It was suggested also that limits be based on the numbers and types of microorganisms attainable under good practice.

Numerical rather than qualitative standards, as a desirable proposition, had no opposition. The practical difficulties were found to lie in determining what quantity of growth is hazardous or indicative of improper storage or preparation in a given test or situation. There is also the need to determine quantitatively the presence of specific pathogens such as staphylococci and salmonellae. A further consideration was the current lack of sufficient personnel and laboratories to perform as many tests as might seem statistically necessary.

5. The immediate practical achievement of the conference was to agree on the need to seek support through the NAS-NRC, and its working committees, for continuing and expanding efforts to develop and apply standards. The practical value of such standards were believed to be foreshadowed by past achievements. However, none felt that microbiological standards by themselves would suffice to protect consumers from infection, poison, or spoilage. The gains in public protection, it was agreed, would require further advances in the knowledge and practice of sanitation by professionals and technicians, commercial interests, and consumers. There was no issue between realists and perfectionists: all accepted the virtue of directing attention toward specific situations where microbiological standards seem most likely to improve the safety and quality of mass-market foods.

None of the questions posed was solved specifically or absolutely. For such answers, the conference looked forward to specific studies.

Conferees' Comments

Dr. Robert F. Korn, deputy health commissioner of New York, reminded the conference that in these days of mass production and international distribution, with long-term refrigerated storage, the classical point-source outbreak of food poisoning is no longer typical.

Instead, the epidemiologist confronts individual illnesses with no common location or period, even though they have a common source. For example, he cited a collection of cases of typhoid fever, identified as type E1, which occurred chiefly in adolescent males in half a dozen States, with 11 in New York alone. Although candy was suspected, the best efforts of a crew of epidemiologists failed to identify the source.

Other complications in the use of microbiological tests, Korn mentioned, were the presence of toxins without viable organisms, as in the staphylococcal enterotoxin which occurred in dry powdered milk in Puerto Rico, the possible viability of viruses or rickettsia in animal food products, and the presence of carcinogenic or toxic chemicals. He also observed that while foods may characteristically produce a high plate count, it is advisable to relate the application of microbiological standards to those foods and situations known to produce significant amounts of disease rather than to apply such measures routinely to all classes of foods. He expressed a faint hope that improvements in surveillance and reporting would strengthen the case for specific microbiological standards.

In this same precautionary vein, Dr. L. Joe Berry, speaking for the Committee on Medical Microbiology, mentioned the phenomenon of mixed infections, citing experiments in which germ-free animals resisted infection by *Entamoeba histolytica* until they were also exposed to *Escherichia coli*. He also cited a reversed relationship, reported by Schaedler and Dubos to the Society of American Bacteriologists in May 1960, in which pathogen-free mice were found more susceptible than standard Swiss mice to *Mycobacterium tuberculosis*, *Klebsiella pneumoniae*, and *Staphylococcus aureus* until inoculated with a specific strain of *E. coli* from the intestines of the Swiss mice.

Allowing for all such limitations and a few more, Dr. D. A. A. Mossel, Central Institute for Nutrition and Food Research, Utrecht, The Netherlands, asserted that microbiological tests have demonstrated their value in several respects, as a supplement to education, sanitation, and inspection. He cited microbiological studies which found pathogens in raw foods which would otherwise have been unsuspected and undetected. Other uses of the tests, he

noted, are to provide a check upon careless, erratic, or too congenial inspections; to offer final evidence that a given process is adequate and proper; and to establish goals for the improvement of sanitation in food.

Mossel urged, however, that standards of tolerance be specifically adapted to each separate food in a realistic way, that they be expressed numerically, that they pertain to specific organisms, using valid nomenclature, and that they be accompanied at all times by satisfactory standard methods of examination.

Speaking on the kinds of foods which might be subject to microbiological standards, Dr. Glenn G. Slocum, Food and Drug Administration, cited Thatcher's listing of such factors as the nature of foods; the method of processing, handling, and distribution; the opportunity for contamination, multiplication, or toxin formation; and the antimicrobial treatment, such as cooking. These factors, he said, focus attention on nonsterile foods consumed without adequate treatment.

Specifically, he mentioned foods which embrace all the factors: cream-filled or custard-filled bakery products, high protein foods, egg and potato salads, and products widely distributed for sale "more or less" under refrigeration. At the same time, he observed that the very perishability of such products limits the value of tolerance standards in removing them from the market, although the microbiological tests, he said, would lead to correction of errors in the chain of distribution. Frozen and dehydrated foods combine most of the factors except that opportunity for growth of microorganisms is limited by the means of preservation and distribution.

He expressed less concern with fresh or raw foods and canned foods as general classes, but in each category he cited specific instances in which apparent hazards might be decreased through microbiological studies.

Slocum emphasized, however, that neither he nor the Food and Drug Administration specifically advocates microbiological standards for any class of foods at this time. As he observed in his opening remarks, his agency is already vested by law with responsibility for protecting the public from food which contains a poisonous or deleterious substance, which is filthy or de-

composed, or which is prepared, packed, or held under insanitary conditions.

In the discussion, there was general agreement with a view, expressed by Dr. F. S. Thatcher, Department of National Health and Welfare, Canada, that efforts to develop standards should be directed primarily to situations which give evidence of the need and which offer an opportunity for practical achievement.

With respect to prevention, while it was conceded that a factory may supply food free of contamination, it was agreed that recontamination is not unusual if not inevitable under common circumstances, such as those cited by Col. John Rizzolo, Armed Forces Epidemiological Board, in reference to experiences of expeditionary forces in places where sanitation is unknown.

As to methods of determining microbiological standards for food, Prof. Aage Jepsen, Royal Veterinary and Agricultural College, Denmark, recommended a balance between the desirable and attainable. Emphasizing that foods must be appraised according to their specific nature and use, he described four categories, each requiring different consideration. High-temperature heat-treated hermetically packed foods, such as canned meats, being moist and lacking inhibitors such as salt, he said, may be vulnerable to microbial growth. Cultures from pre-incubated samples of such foods, he suggested, should prove sterile or yield only a scanty growth of organisms incapable of multiplication in the container.

Low-temperature heat-treated hermetically packed foods, such as cured hams, he said, containing salt and nitrite, allow only a restricted growth of salt-tolerant organisms. In these conditions, he said, gram-negative rods, fungi, and clostridia should be absent, and fecal streptococci and lactobacilli if present at all should be insignificant. The total count of aerobic organisms, he suggested, should be less than 10,000/gm., usually much less.

Low-temperature heat-treated nonhermetically packed foods, he noted, may be subject to recontamination, and standards of tolerance would be related to the probability of recontamination and the subsequent methods of storage and processing. In any event, he recommended that salmonellae should be absent.

Non-heat-treated salted or chemically preserved foods, such as anchovies, he said, carry a microbial population whose total numbers bear little relation to keeping quality. However, he thought it might be useful to test them for pathogenic or toxinogenic organisms.

Fresh or raw frozen foods, he said, develop a bacterial count which may be related to temperature as well as to storage; but whatever the cause, a heavy microbial load in perishable foods indicates spoilage. He suggested raw frozen foods and raw shellfish as candidates for standards similar to those suitable for low-temperature heat-treated nonhermetically packed foods.

Speaking to the adequacy of microbiological standards as indicators of the sanitary conditions of food processing, Thatcher emphasized that the chief hazard of contamination is associated with the food handler, in the factory as well as in the kitchen, but he also mentioned defective design, construction, or maintenance of equipment or plant, direct contamination by rodents or insects, time-temperature factors in processing, and the quality of water used in the plant.

Although Canada uses the standard plate count, fecal indicators, and staphylococci tests chiefly as a check on plant sanitation, Thatcher recommended that the test for *E. coli* be favored as more likely to demonstrate the presence of fecal organisms, including enteric viruses. Because of their ubiquity, he questioned the merit of a zero requirement for staphylococci, but said he was ready to revise his views if foods become a vehicle for antibiotic-resistant strains of a virulent type.

Thatcher suggested that the standard plate count itself might serve as an indicator of defects in the chain of food production but indicated that he would also like to see a rapid and efficient method for detecting salmonellae.

The value of microbiological standards in promoting sanitary conditions in industrial food products, he stated, has been demonstrated not only with dairy products but with gelatin, bone meal, raw oysters, and crabmeat. While frozen foods have improved considerably in the absence of specific standards, he felt that the industry was spurred by the prospect of standards, as well as by its business interest.

While he did not imply that tolerance standards automatically guarantee safety in food, he said the presumption of safety favors foods that meet such standards. Also he noted that microbiological standards tend to encourage the selection of high-grade raw materials and their careful management. The coding of food lots, he observed, helps to isolate and recover foods found by microbiological examination to be dangerous. The opportunities for collaboration between the regulators and the regulated, he suggested, warrant earnest study.

In a program of action outlined for industry and government, Thatcher included factfinding and education in relation to new foods; standards for familiar foods offering experience with hazards or spoilage; development of industrial codes; enforcement of standards; education of food handlers, including transport workers, restaurant managers, and housewives; and development by industrial associations of mobile teams of "troubleshooters."

The tests which are favored, and their limitations, were discussed by Dr. Harry E. Goresline, Quartermaster Food and Container Institute for the Armed Forces, who, like Mossel, put special emphasis on the standardization of methods of examination, as essential to standards of tolerance. He also asserted that standards of operation in the food industry, determined by surveys of actual practices, should be no less important than standards of microbiological quality.

With respect to the former point, he cited studies which demonstrated the wide range of bacterial counts that resulted from slight differences in temperatures, media (presumably identical), sampling, or procedure. Before determining microbiological tolerances, therefore, he asserted that it is desirable to obtain data collected by standardized procedures. The next step he recommended was to limit requirements of the standards to attributes necessary for control and to microbes of true significance. Third, he proposed universal adherence to standard methodology, from sampling to reporting. Finally, he suggested that a range of counts, rather than a specific maximum, would be best for tolerance limits, except for certain pathogens which should be kept to the lowest level possible, in proportion to the hazard.

Specifically, he urged consideration of the "Recommended Methods for the Microbiological Examination of Foods," published by the American Public Health Association, as a step toward establishment and acceptance of standards methods.

Conceding that standards seem a worrisome burden to some and a necessity to others, he believed a meeting of the minds was possible.

With regard to the relation between microbiological standards and component product control, Dr. Millard Gunderson, associate director of bacteriological research for Campbell Foods, devoted his statement mainly to the special characteristics of frozen foods which, it was generally agreed, have in general improved in sanitary quality in the past 10 years in the absence of specific standards. The industry, he said, finds fewer public health hazards in the microbial population of frozen foods than threats of waste or spoilage. Each package, he said, is a micro-climate which, in fluctuating temperatures, may develop growths of mold. Having given attention to the proper selection, storing, and processing of frozen foods, he said, it is still necessary to follow through to assure storage at zero temperatures by the vendor and the consumer. As evidence of the effectiveness of sanitary controls, he offered data indicating the range of and average microbial counts in frozen food samples taken from retailers. He emphasized that biological tests serve mainly, after the fact, to assure the operator that sanitation processes are adequate. Under practical working conditions, he indicated it was difficult to pinpoint variations in the line which might produce sporadic samples with high microbial counts.

Dr. G. M. Dack, University of Chicago, opened with the statement: "No simple microbiological standards can be applied to all classes of food. In the application of microbiological standards, careful thought should be given to the quality of the raw ingredients entering the product, how the product is made and packaged, and conditions of time and temperature of storage from the time of production to the time it reaches the consumer. Of importance is whether the end product, in any stage of processing, provides conditions for the multiplication of food poisoning micro-organisms."

He proceeded to draw upon his experience with a number of foods to illustrate the variety of conditions for the multiplication of food poisoning organisms. He noted that when heating destroys the competitors of *Clostridium botulinum* in cheese spreads, the organism may grow and emit toxin. A similar possibility was found in connection with canned hams, but as 5 million canned hams have been sold with no case of botulism, the hazard apparently does not exist in American packing houses.

Dack attributed outbreaks due to staphylococcal enterotoxin in part to the fact that the enterotoxin is resistant to the usual heat treatments. No such hazard is found in precooked frozen foods because they are cooked at 350° F. for 40 minutes before serving. The main source of such food poisoning, he said, is the food handler with pyogenic lesions, where contamination is followed by time and temperature sufficient to build up toxin. It takes millions of staphylococci, he said, to produce enough toxin to cause illness.

Protection from salmonellae in poultry and meat products, he said, is provided as a rule by the fact that the products are cooked before serving. However, Dack mentioned that one of the possibilities in the dissemination of salmonellosis is the widespread use of frozen and dried eggs in food processing in this country. For example, in an angel food cake mix, picked up in the markets in January 1960, 15,000 *Salmonella montevideo* organisms were recovered per gram of the egg white mix in the product. Since this egg white powder is diluted approximately 1:3 with sugar, this would represent approximately 50,000 *S. montevideo* per gram of the dried egg. Products of this sort may have sufficient salmonellae to cause illnesses in children eating cake batter prior to baking. A suggestive example was an outbreak of *Salmonella reading* infection, involving 325 widely distributed cases, mostly in small children. The source of this outbreak, however, was not established. The cake mix manufacturers were apprised of this condition, and they have placed microbial specifications on dried egg white. With these self-imposed standards by industry, salmonellosis hazards are reduced.

During the discussion, Jepsen observed that heating liquid egg white to 56° C. for 3 minutes

appeared to be effective, even if all salmonellae were not destroyed.

Dack also mentioned the hazard of *Bacillus cereus*, a soil organism natural to cereal products, which was responsible for a large number of illnesses in Norway among those who ate a commercial vanilla pudding. After cooking, it had been left at a warm temperature for several hours, permitting surviving spores to grow.

In conclusion, he recommended labels give specific directions for refrigeration and cooking, to reduce hazards of food poisoning.

Dr. Leon Buchbinder, New York City Health Department, referring to the value of microbiological standards in improving the safety of water and milk, noted that the plate count standard for milk had been reduced from 500,000/ml. in the 1900's to 30,000/ml. currently. However, he pointed out that milk and water management are distinguished from foods in general by relatively closed processing and distribution systems and a limited number of processing plants and channels of distribution. Food management is handicapped further, he added, by the ubiquity of organisms that cause food poisoning, apathy of most of those who should be concerned, and the apparent assumption by many health authorities that food poisoning is well controlled.

He offered as a guess the estimate that there are 500,000 cases of food poisoning in the United States annually. With respect to salmonellosis alone, Slocum mentioned a seven-fold increase in reported cases nationally between 1950 and 1957. A similar gain, he said, was reported in Massachusetts, which has a long record of reporting such incidents.

Speaking of practical experience in a city laboratory with microbiological standards, Buchbinder stated that a frankly arbitrary tolerance had been effective in improving sanitation of specific foods notoriously associated with outbreaks.

The methods used include the plate count, coliform count, *S. aureus* count, enterococcus count, and *Salmonella* isolation. Isolated staphylococci are phage tested. A plate count above 750,000/gm. for staphylococci and enterococci in foods associated with an outbreak warrants a test for pathogens. Phage typing, said

Buchbinder, has implicated foods with low counts of staphylococci. Buchbinder expressed also the view that the standard plate count discounted the need for a coliform count. Jepsen and Slocum, in discussion, stated that coliform determinations provide information not revealed by the plate count alone.

In addition to testing foods implicated in outbreaks, the laboratory examines "check-up" foods associated with the implicated foods, which are not usually available. Other tests are performed on samples taken in general surveys of foods considered vulnerable.

The surveys are used mainly for preventive purposes, as in connection with frozen pre-cooked poultry products. Of 17 samples from one manufacturer, 13 were found to have counts of 1 million or more.

At about the same time, the department surveyed custard-filled items from 65 wholesale bakeries, establishing a standard plate count not to exceed 100,000/gm., and a coliform standard of no more than 10/gm. More than two-thirds of the bakeries flunked the test. Some of these improved their procedures and the count declined. The others made no improvement and were requested to discontinue the line. Several hundred retail bakeries have been examined annually on the same basis in recent years.

Standards for fresh crabmeat established by New York City (plate count not to exceed 100,000/gm., enterococcus, no more than 1,000/gm., staphylococcus and coliform, no more than 100/gm.) touched off a broad reform in packing practices on the eastern seaboard. The percentage of samples failing the test declined from 63 in 1953 to 37 in 1956, about the current level. Buchbinder also reported experiences with skinned, precooked, packaged, ready-to-eat beef tongue and with frozen, breaded, codfish cakes, demonstrating the value of microbial tests in supporting the efforts of sanitarians.

In conclusion, Buchbinder referred to the requirements applied to food purchased by the Armed Forces as evidence of the contribution of microbiological standards to the prevention of food poisoning.

Dr. John Silliker, Swift and Company, described in detail variations in food, flora, and processing which affect microbiological stand-

ards. He demonstrated several instances in which microbiological standards at a given stage of processing by themselves are meaningless with respect to safety or keeping quality of food. He emphasized consideration of the quality of raw materials, the treatments used, and the different microbial characteristics of individual components of a food product.

The need for administrative arrangements which would enable professional societies, trade associations, enforcement agencies, and others to work together effectively to develop mutually acceptable standards for the protection of the public was advanced by Dr. Keith H. Lewis, Public Health Service. Referring to the various efforts current, he commented that participation was associated with difficulties in obtaining timely action and continuity. He proposed that another meeting concern itself specifically with developing a workable plan, including mechanisms for coordination and financial support.

Lewis also suggested that specificity is an inherent characteristic of microbiological standards for foods, to judge by experience with water, shellfish, and dairy products. Methods and criteria, he said, must be appropriate to specific microflora, various potential contaminants, chemical and physical conditions, processing techniques, and distribution practices, if standards are to offer genuine protection. Although general standards for dissimilar foods may be expedient, he said, they are not adequate.

In summarizing the discussion, Goresline observed, "There was the feeling that within the framework of the food industry, the distribution and regulatory fields, something should be done to improve the sanitary quality and handling of food products. There was praise for the improvements that have taken place in the last few years, but with it an appeal to continue the rise. There were suggestions to broaden the areas of concern from the public health standpoint to include the viruses and chemicals. . . .

"Several speakers repeated the theme of the relationship of raw product quality and practice of good handling to the sanitation and quality of food offered the consumer. There has been a feeling that most food poisoning outbreaks could have been prevented if good prac-

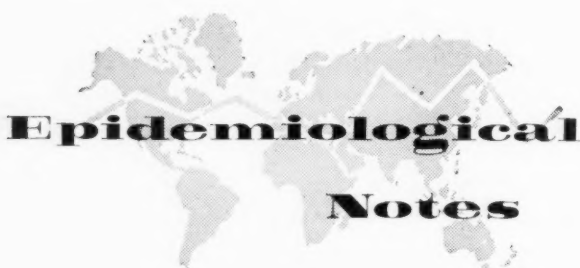
tices had been employed. This indicated a great need for a more effective educational program aimed at every segment of the chain from producer to consumer. It was demonstrated that a motivated commercial producer of food products can through a rigid quality control program, and training of employees, consistently put out products of good sanitary quality. There is a need to spread this motivation.

"It was pointed out that regulations and laws spell out certain standards without indicating them as such. Experiences with standards have been good for the most part, but I heard no one advocate them for all products or for food in general. It was pointed out that there were different classes or types of food, each with its own needs, uses, and even different flora."

He pointed out that the conference favored standards with a definite use, but recognized that such functions might be performed by other methods. Difficulties in administering and interpreting standards were linked to the methodology and techniques employed. The conference inferred therefore, he suggested, that thorough investigation is a necessary preliminary to the establishment of standards.

He praised the conference for its coverage, the opportunity to exchange ideas, and to improve mutual understanding of the factors relating to food safety.

The conferees in general agreed that there were always implicit goals of microbiological quality which influence both the management and regulation of food processing.



Retroental Fibroplasia

The rate of decline in incidence of retroental fibroplasia is indicated by figures obtained by the National Society for the Prevention of Blindness from seven States. Hyperoxia was associated with retroental fibroplasia by K. Campbell, in the *Medical Journal of Australia* in 1951. Confirmation of this hypothesis was prominently published in 1953 and 1954; publications included newspaper feature stories and an article in the *Saturday Evening Post*.

States reporting the cases totaled here are California, Connecticut, Kansas, Massachusetts, New Jersey, New York, and North Carolina. Reporting

in 1957 was incomplete, and only 5 States reported in 1958. Following are the reported new cases of blindness caused by retroental fibroplasia:

Year	New cases
1950	278
1951	363
1952	464
1953	442
1954	170
1955	62
1956	35
1957	10
1958	7

Despite the abrupt decline in incidence, it is evident that to provide maximum protection against blindness associated with retroental fibroplasia, doctors, nurses, and hospital administrators need to adhere vigilantly to procedures recommended for administration of oxygen to premature infants.

An annotated bibliography on the relationship of oxygen therapy to retroental fibroplasia is available from the National Society for the Prevention of Blindness, 1790 Broadway, New York 19, N.Y.

The Institutionalized Population in Minnesota

STEPHEN J. CARROLL, Jr., M.A.

STATISTICS on the number of handicapped persons in hospitals and related institutions by type of disability are rare, except for those dealing with specialized types of institutions (1-4). A number of surveys on the extent of disabling illness and disease among the general population have been conducted, but typically such surveys exclude the institutionalized population. This lack of information makes any general disability survey incomplete, since the disabled in institutions are likely to form a significant portion of such a census.

Between July 22 and August 4, 1958, a survey of the entire institutionalized population of Minnesota was conducted under the direction of Dr. L. H. Lofquist and Dr. G. W. England of the University of Minnesota's Industrial Relations Center, for the State Interim Commission on the Employment of the Handicapped. This commission was appointed to investigate the problems of the handicapped population in Minnesota (5).

The purpose of this survey was to determine the number of handicapped persons by type of disability and age in all types of institutions and hospitals in the State. Every hospital, both general and specialized, institution, special school, nursing home, and boarding-care home was covered. The survey was completed in conjunction with a related survey covering a random sample of households in Minnesota. In the household survey, interviewers were required to identify all household members who were away in a hospital, institution, or

special school to prevent disabled persons from being counted twice. The results of the household survey are published elsewhere (6). This report deals only with the institutional survey.

Methodology

A list of all licensed hospitals both general and specialized, institutions, special schools, nursing homes, and boarding-care homes in Minnesota as of May 1, 1958, was obtained from the Minnesota Department of Health (7). This list was supplemented by the addition of the names of all public specialized institutions and schools concerned with confinement and training under the control of the Minnesota State Department of Public Welfare and all Federal hospitals within the borders of Minnesota. A check of this list against all hospitals and related institutions listed in the Minneapolis and St. Paul telephone directories resulted in the addition of only one institution, a boarding-care home.

A questionnaire was designed to identify all persons who were handicapped and currently hospitalized or institutionalized in Minnesota by type of disability and age. In developing the questionnaire, consultations were held with the directors and medical personnel of several of the larger hospitals and institutions in Minneapolis. These consultations were held to determine the best method of classifying patients as handicapped and to see what terminology was most common and understandable to hospital personnel.

The questionnaire was worded in such a manner that it could be completed by the physician in charge of each ward, by the nurse in

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charge of each nursing station, or by the medical person in charge of each hospital or home. A patient was to be classified as handicapped if he or she was expected to be totally or partially impaired in carrying out normal activities for the next 90 days, whether still hospitalized or not. The term "impaired in carrying out normal activities" was used in place of the term "handicapped" since it was preferred by hospital and medical personnel consulted in preliminary studies. Ninety days was used as the time period for which an impairment would be considered serious enough to be classified as a handicap since 90 days, or 3 months, is the time period most frequently used to distinguish chronic diseases and severe disabilities from other less severe types (8, 9). Length of time hospitalized was not used as the criterion for classifying patients as handicapped because it excludes many chronically ill or disabled persons and also may not be indicative of the extent or severity of a disability or disease.

Fourteen broad disability categories, derived from the disability classification systems of the Minnesota Employment Service and the Minnesota Division of Vocational Rehabilitation, were used in the questionnaire. Three age groups were used to distinguish potential members of the labor force from those patients younger or older than this group.

Questionnaires were mailed to each of the 641 hospitals, special institutions and schools,

nursing and boarding-care homes on the survey list. Hospitals and institutions with a capacity of more than 150 beds were sent additional questionnaires upon request for use in each ward or at each nursing station, if this procedure was preferred. A followup postal card was sent to nonresponding institutions after 2 weeks, and a followup letter was sent to nonrespondents after 3 weeks to encourage increased returns.

As a verification of survey accuracy, returns from the large specialized institutions, such as mental hospitals and institutions for the mentally defective, were compared with data obtained from the Minnesota State Department of Public Welfare (1). The survey indicated that there were 14,338 impaired patients in such institutions, while the Minnesota State Department of Public Welfare reported 14,202 patients as of June 1958. A comparison of figures for each institution also agreed quite closely.

The proportion of usable returns gives another measure of the accuracy of the survey. In terms of this criterion (proportion of returns), the results obtained in the survey may be accepted with confidence since usable returns were received from 82 percent of the hospitals and related institutions in Minnesota. These hospitals and related institutions contain 91 percent of beds available in the State. Each table presents data adjusted to account for nonresponding institutions. In making estimates

Table 1. Number of physically handicapped patients in Minnesota hospitals and related institutions, by type of institution

Types of institutions	Bed capacity of institutions to which questionnaires were sent	Bed capacity of institutions from which questionnaires were received	Number of impaired patients reported	Percent of beds occupied by impaired patients ¹	Number of impaired patients corrected to include nonrespondents ²
Federal hospitals.....	2, 456	2, 443	1, 693	69. 3	1, 702
General hospitals.....	14, 558	14, 298	5, 273	37. 1	5, 402
Mental hospitals.....	10, 890	10, 863	10, 794	99. 4	10, 820
Institutions for the mentally deficient, epileptic, or tuberculous.....	6, 814	6, 814	6, 191	90. 9	6, 191
Other special schools, hospitals, and institution infirmaries.....	1, 008	948	706	74. 5	751
Nursing and boarding-care homes.....	13, 545	9, 718	7, 288	75. 0	10, 157
Total.....	49, 271	44, 994	31, 945	70. 9	35, 023

¹ Obtained by dividing column 3 by column 2.

² Obtained by projecting from percentage in column 4 to bed capacity in column 1.

Table 2. Percent of institutionalized handicapped population of Minnesota, by type of disability within major age categories

Disability	All ages (N=35,023)	Under 14 (N=1,860)	14 to 65 (N=16,408)	Over 65 (N=16,746)
Neuropsychiatric	35	6	44	29
Mental retardation	19	53	30	4
Cardiovascular	13	3	4	23
Generalized or systemic	7	2	3	12
Orthopedic	5	9	3	6
Neurological	4	4	4	5
Miscellaneous	4	2	3	6
Respiratory	3	4	4	3
Visual	2	6	1	3
Hearing	2	9	1	2
Gastrointestinal	2	0	1	2
Genitourinary	2	1	1	3
Skin and allergy	1	1	0	1
Speech	1	0	0	1
Total percent	100	100	100	100

NOTE: Numbers adjusted to include nonresponding institutions.

to account for nonrespondents, it was assumed that the returns from the nonrespondents in a particular type of hospital or institution would assume the same proportions regarding the number of handicapped persons in each disability and age category as did the returns from the respondents. This assumption was made in view of the high percentage of returns received and in the absence of any evidence that the characteristics of the nonrespondents were different from those of the respondents.

The percentage of available beds occupied by handicapped persons varies widely depending on the type of institution (table 1). While the whole population (99 percent) of the State's mental hospitals is handicapped, according to the definition used in the study, only a little more than one-third (27 percent) of the population of general hospitals is handicapped. This is certainly not surprising in view of the types of disability treated.

Almost all of the Federal hospital beds are located in two large veterans' hospitals in Minnesota. Since one of these is a specialized institution for the treatment of emotional disorders, it is also not surprising to find 69 percent of the available Federal hospital beds occupied by handicapped patients.

Neuropsychiatric disabilities (35 percent)

and mental retardation (19 percent) account for more than one-half of the total institutionalized handicapped population of the State (table 2). This bears out previous estimates that more than one-half of the available hospital beds in the Nation are occupied by patients with mental disorders (10). The addition of persons afflicted with cardiovascular (13 percent) or generalized or systemic (7 percent) disorders to those reported with the mental and emotional disabilities reveals that these four types of disability account for three-fourths of the institutionalized handicapped.

The most significant disability of the institutionalized handicapped population under 14 years of age is mental retardation. More than one-half (53 percent) of this age group have this disorder (table 3). Persons with emotional (44 percent) and mental disabilities (30 percent) make up almost three-fourths of the institutionalized handicapped in the productive labor force age group of 14 to 65 years. In the retirement age group of over 65 years of age, neuropsychiatric (29 percent) and cardiovascular (23 percent) handicaps are most prevalent, accounting for more than one-half of the in-

Table 3. Institutionalized handicapped population in Minnesota, by age distribution within disability categories

Disability	Number ¹	Percent in each age group			
		All ages	Under 14	14-65	Over 65
Neuropsychiatric	12,259	100	1	59	40
Mental retardation	6,592	100	15	75	10
Cardiovascular	4,532	100	1	13	85
Generalized or systemic	2,556	100	1	21	78
Orthopedic	1,759	100	9	30	61
Neurological	1,514	100	5	42	54
Miscellaneous	1,529	100	2	33	65
Respiratory	1,145	100	7	56	37
Visual	816	100	14	20	66
Hearing	741	100	24	20	56
Gastrointestinal	614	100	1	37	62
Genitourinary	613	100	3	18	79
Skin and allergy	186	100	7	36	57
Speech	158	100	3	18	79
Total	35,023	100	5	47	48

¹ Adjusted to include nonresponding institutions.

stitutionalized handicapped in this age category.

Table 3 shows that 85 percent of the institutionalized handicapped with cardiovascular disabilities are over 65 years of age, as are 78 percent of those patients who have generalized or systemic disorders. Generalized or systemic disorders include such disabilities as diabetes, cancer, and arthritis. Three-fourths (75 percent) of the mentally retarded patients are between 14 and 65 years of age.

Summary

A survey of the institutionalized handicapped population of Minnesota was conducted between July 22 and August 4, 1958. The purpose of this survey was to determine the number of physically handicapped persons in all types of hospitals and related institutions in Minnesota by type of disability and age. This information was not available before the survey.

A questionnaire, designed to obtain this information, was sent to every hospital, both general and specialized, institution, special school, nursing, and boarding-care home in Minnesota. With the aid of two followup letters, usable returns were received from 82 percent of the hospitals and related institutions in the State. These hospitals and related institutions contained 91 percent of the beds available in hospitals and institutions in the State.

The survey indicated that currently about 35,000 handicapped persons are hospitalized or institutionalized in Minnesota. These persons occupy more than 70 percent of the beds available for the care of patients in the State. Almost one-half of them are over 65 years of age. Persons with neuropsychiatric disabilities (35 percent) and mental retardation (19 percent) comprise over one-half of the institutionalized handicapped in the State. Cardiovascular (13 percent) and generalized or systemic (7 percent) disabilities bring this figure up to almost three-fourths of the total institutionalized

handicapped. Mental retardation seems to be the most significant disability for the group under 14 years of age, while neuropsychiatric disabilities are most prevalent in those 14 to 65 years of age. Neuropsychiatric and cardiovascular disorders account for more than one-half of the handicapped in the over 65 age group.

The success of this survey demonstrates that it is possible to obtain reasonably accurate disability statistics of the general institutionalized population by using a mail questionnaire method.

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The Issues

IN CHRONIC DISEASE CONTROL

The State and Territorial Chronic Disease Program Directors organized as an association at their third biennial meeting held in Chicago, September 21-23, 1959, and affiliated with the Association of State and Territorial Health Officers.

"Health Department Leadership in Chronic Disease" was the theme of the meeting. Resolutions on chronic disease adopted by the association are briefed in this report, and two of the papers presented to the conference are summarized.

Officers elected for the current year are Dr. Lester Breslow, chief, division of chronic diseases, California State Department of Public Health, president; Dr. Harold S. Barrett, deputy commissioner and director of chronic disease control services, Connecticut State Department of Health, vice president; and Dr. Forest R. Brown, director, division of chronic disease control, Oklahoma State Department of Health, secretary-treasurer.

On the executive committee are Dr. Marian R. Stanford, director, chronic illness control, State Department of Health, Trenton, N.J.; Dr. Milton Feig, acting director, division of chronic diseases and aging, Wisconsin State Board of Health; Dr. J. L. Jones, head, chronic disease section, Washington State Department of Health; and ex officio, Dr. Frank W. Reynolds, formerly director, bureau of chronic diseases and geriatrics, New York State Department of Health, now associate professor of public health practice, University of Michigan School of Public Health.

Resolutions adopted by the newly formed Association of State and Territorial Chronic Disease Program Directors at their meeting last fall reveal an assessment of the current issues in chronic disease programs throughout the Nation. In each instance, the resolutions recommended actions to the parent organization, the Association of State and Territorial Health Officers.

Full-Time Leadership in Chronic Disease. Health officers should be urged to give full-time medical and public health leadership to chronic disease activities and establish appropriate organizational units in their health departments.

Diabetes. The Public Health Service should be requested to convene an expert committee to establish standards for screening and diagnostic followup in the early detection of diabetes. It was stated that full use of modern knowledge is not current practice in diabetes casefinding.

Nursing Homes. Delegation of responsibility for licensing and continuing supervision of nursing homes as a function of State departments of health was recommended.

Homemaker Service. State health officers should be requested to act with State welfare and other appropriate agencies to promote community homemaker services as a component of a full home care program.

White House Conference on Aging. There should be vigorous leadership by health officers to insure adequate emphasis on the health aspects of aging in the 1961 White House Conference and in all preceding local conferences.

Disability. Health officers should be urged

to assume leadership in developing programs in disability, including aid to disabled persons whose goals are less than employment, and in seeking Federal funds to implement programs with this objective.

Epidemiological Method. Health officers should be urged to promote further use of the epidemiological approach to chronic disease control.

Social Work, Social Science, and Behavioral Science. Encouragement should be given to the use by health departments of workers in the social sciences.

As a final formal action, the association approved the concept of Federal grants to local health agencies for chronic disease control activities. It recommended vigorous support of the new community cancer demonstration project grant program of the Public Health Service. It was suggested that health officers take the lead in seeking substantial additional Federal grants for other categories of chronic disease control and in developing plans for such a project grant program.

Caring for the Chronically Ill In Existing Facilities

It has been estimated that the minimum number of facilities needed for the care of the chronically ill and disabled is two beds per 1,000 population. If most States are like Michigan, it will, in all probability, be a long, long time before 15,000 beds for the chronically ill are available within their boundaries. Brick and mortar programs for care of this portion of our sick population are very important; nevertheless, we cannot afford to wait to take steps to improve and extend facilities for the care of this group until the ideal quota of beds and housing is reached. State and local governments should plan carefully and initiate programs so that each year brings progress in terms of better facilities. In the meantime, governmental agencies also should consider

what physical facilities are available or can be adapted for care of the long-term patient.

Most chronically ill patients are admitted to a general hospital during the acute phase of their illness and they are not distinguished from other patients who are acutely ill. Rehabilitation services which should begin during this acute stage of illness or disability are not made available. Later no provision is made for transfer of the chronically ill to other facilities which supply the continued care and treatment they need.

As the local general hospital is considered more and more as a community health center, the ideal solution to the problem of giving hospital care to long-term patients would be to extend and coordinate the facilities and services of the general hospital, through the construction of a chronic disease annex or a county medical care facility adjacent to and obtaining most of its services from the general hospital.

An independent chronic disease hospital should be considered necessary only when there is no practical way to provide long-term care in a general hospital, either physically or administratively.

Rather than wait until these highly desirable facilities can be provided, however, immediate needs in the treatment of the chronically ill should be met by using fully all services and physical plant areas now available in existing facilities. Consideration should be given to:

- Conversion of a former unit of a general hospital, such as a discontinued nurses' residence or excess bed capacity, to a chronic disease unit or skilled nursing home.
- Greater use of county medical care facilities, through the extension of additional services offered to patients.
- Conversion of tuberculosis sanatoriums with excess beds to a chronic disease hospital or skilled nursing home.
- Development of a closer relationship between hospitals and nursing homes, and upgrading the level of care in nursing homes by supplying nursing and medical supervision or consultation in the same manner as some hospital personnel are overseeing the operation of small community health centers.

Based on a paper by John A. Cowan, M.D., director, division of tuberculosis and adult health, Michigan Department of Health, Lansing.

- Greater use of diagnostic facilities in hospitals by supplying outpatient services for the chronically ill, ambulatory patient.

- Development of home care programs through the coordinated efforts and facilities of all local agencies, voluntary, private, and tax-supported.

Transition in Michigan's Sanatoriums

In Michigan in June 1959 there were 19 State-approved tuberculosis sanatoriums with a total capacity of 4,188 beds. As in most other States, the bed needs for tuberculosis are declining. Changes and improvements in the treatment of tuberculosis have brought us toward much shorter periods of hospitalization than was true a few years ago. This, as well as the lower incidence of tuberculosis, has lessened the need for beds for the hospital care of the tuberculous.

As a result, many tuberculosis hospitals have only a small fraction of their beds filled, per diem costs have skyrocketed, and it has become a prerequisite to economic survival to plan for other uses of their excess beds, or of the entire institution.

In 1957, Michigan passed the following legislation concerning county tuberculosis hospitals: "The board of trustees, with the approval of the board of supervisors, may in its discretion admit patients to said hospital for the treatment of diseases other than tuberculosis under such terms and conditions as prescribed by said board of trustees and approved by the State health commissioner. Persons . . . suspected or afflicted with tuberculosis and requiring hospitalization in the hospital or sanatorium shall be given priority of admittance."

Since 1950, 11 tuberculosis hospitals approved by the State have closed. Of the 15 county sanatoriums now in operation, 7 have converted their facility to admit chronic disease patients under the 1957 legislation. Although tuberculosis sanatoriums in general are far from ideal chronic disease hospital facilities, they can be adapted to become fairly satisfactory institutions with certain modifications in physical organization and in the type of staff. Evaluation of the use of these facili-

ties for the care and treatment of the chronically ill should be made on an individual basis.

Advantages

The medical, nursing, and other staff of tuberculosis hospitals understand the problems of the long-term patient. The tuberculosis patient today, in most instances, is aged, with other chronic illnesses that must be treated simultaneously. Those who realize the difficulties encountered by the staff in most general hospitals dealing with long-term patients already know that familiarity with care of the long-term patient is a distinct advantage.

Existing services, such as occupational therapy, dietary, X-ray, laboratory, medical, and nursing services, can extend to the non-tuberculosis unit. On the other hand, social service, physiotherapy, and other special services required for care of the nontuberculous will also improve the care of tuberculous patients.

With the disease declining in emphasis, it is difficult to recruit good medical, nursing, and ancillary personnel for a tuberculosis hospital. Chronic disease care is a rapidly expanding field and is more attractive to hospital personnel.

Proration of the expense of administration, housekeeping, maintenance, utilities, and the like results in a reduction of the per diem costs of the tuberculosis unit as well as the chronic disease unit, because of better use of facilities.

Disadvantages

Unfortunately, some local practicing physicians in general hospitals tend to refer to the chronic disease hospital patients whom they do not wish to treat, patients that no one else wants. Many of these patients are very ill and some of them moribund at the time of admission to the hospital.

There is always the possibility that, under these circumstances, medical and nursing staffs will become so concerned with emergency problems that the tuberculosis patient will be neglected. As an illustration, the death rate of nontuberculous patients in two specific sanatoriums has averaged from 20 to 40 percent in

comparison with the rate of 2 to 2½ percent in general hospitals. The medical and nursing duties for these dying patients are not only mandatory, but time consuming. Also, when treating these two types of patients at the same facility, tuberculous and nontuberculous, the problem of cross-infection must be considered at all times. Although this problem is serious, it is by no means insurmountable, however, and practical solutions have been found.

Local welfare departments may transfer postoperative and other acutely ill patients from the high-cost general hospital to the low-cost chronic disease hospital prematurely. These patients, when admitted to the chronic disease unit, require a disproportionately large degree of medical and nursing staff time, which greatly increases the cost of the care.

Factors in Transition Planning

There is need for a plan for progressive treatment of the chronically ill or disabled patient from the acute stage to the maximum point of rehabilitation potential, which may mean self-sufficiency, self-care, or partial care in a foster home, or other care, using whatever services or facilities may be available.

Admission and discharge policies should include a decision that only those patients should be admitted who will benefit from active medical care; specific planning of the level of patient care; and a clearly defined discharge policy if the chronic disease hospital is not to become purely a domiciliary facility. Personnel must be available in the area to meet the need for medical, nursing, and ancillary services. Medical specialty services on a consultation basis should also be available, plus the physiotherapist and occupational therapist, social worker, and adequate nursing personnel. The full-time medical staff must be adequate, qualitatively and quantitatively, since experience has shown that the private attending physician seldom visits the patient; thus medical supervision becomes the full-time responsibility of the staff.

Planning the layout of the physical plant must permit proper separation of tuberculosis and nontuberculosis areas, and the complete cutoff necessary to alleviate the possibility of cross-infection.

A final factor in planning is the potential home care services for the patient after he is ready for discharge to his home or foster home.

An Example in Saginaw

The Saginaw County Hospital was planned initially solely for the care of tuberculosis patients. At a later date its services were expanded to include the care of patients with chronic diseases. Between 1950 and 1954, the capacity of the hospital was expanded to 250 beds to meet the critical shortage of beds for the care of tuberculosis patients. Shortly after the latter addition was completed, the need for beds for tuberculosis patients declined.

While the situation in this particular area was not as critical as in some others, it became evident that consideration would need to be given to eventual conversion of some of the facility to the care of other types of patients. In 1957, after passage of permissive legislation by the State which allowed use of existing beds in tuberculosis hospitals for the care of nontuberculosis patients, application was made to the State health commissioner for approval of a plan for this purpose.

There are three general hospitals and a county infirmary within the city of Saginaw, in addition to the Saginaw County Hospital. There was a definite need in the community for a chronic disease unit. It was believed by many local physicians that this unit should either be attached or adjacent to one of the general hospitals. However, public approval of bond issues for this purpose was refused a number of times. Finally, the county board of supervisors granted approval to construct a chronic disease unit for the care of county welfare patients, as an addition to the Saginaw County Hospital Annex, the former convalescent unit for tuberculosis patients. The new addition, at a cost of \$115,000 plus \$35,000 to make alterations to the old annex, made the total conversion cost \$150,000.

The capacity of the unit is 50 beds. The first floor has a day room, lobby, administrative office, diet kitchen, and eight rooms for patients, three of which are security rooms for the temporary retention of the emotionally disturbed. The ground floor includes the department of physical medicine and a multipurpose room

which serves as a recreation room and chapel. The balance of the ground floor is used completely for the rehabilitation of patients. There are facilities for both physical and occupational therapy, together with facilities used in teaching patients to be self-sufficient upon return to their homes. This section also has access to a park area for patients.

Consultant psychiatrists from the University of Michigan meet with the hospital medical and paramedical staff every 2 weeks to review progress of patients and to evaluate rehabilitation potential of new patients.

Although at first there were a few misunderstandings with the local medical profession about the use of the facility, this problem was solved through close liaison with the geriatrics committee of the county medical society. The chronic disease unit is administered as a part of the hospital, but admissions are authorized by the welfare board; the board of supervisors set a policy of admitting only indigent patients. Private physicians are permitted to treat their own indigent patients, receiving fees for their services from the welfare department. However, this procedure is infrequent, most of the patients being treated by the full-time hospital staff. Medical specialty consultants in Saginaw are available when needed.

There is a great deal of public sentiment in favor of admission of private pay patients but as yet the policy has not been changed.

All facilities of the hospital are available to the chronic disease unit.

Chronic disease services are more expensive than tuberculosis services. It requires one employee per patient to provide nursing, rehabilitation, and housekeeping services. Under certain circumstances, the ratio of employees to patients may go even higher. If laboratory, X-ray, kitchen, and maintenance services are included, the total ratio is 1.5 employees per patient. The total cost including all services in this facility is \$15 per day.

A great many patients have been admitted who have little or no rehabilitation potential. The admission policies are weak since admission and selection of patients is decided by the welfare board and not by the hospital director. Due to the high cost of care in general hospitals, postoperative patients requiring active medical

service are often sent to the chronic disease unit without proper consideration of the main objective of the unit, rehabilitation.

With the support of the county medical society, arrangements have been made for outpatient service to ex-patients so that their progress can be evaluated by the medical and paramedical personnel. With the support of a Michigan Department of Health grant, the rehabilitation center is used also as a focal point for instruction and training of patients and is an integral part of an organized home care program to which many of the patients are discharged.

Comparative Costs

The average per diem cost of 23 representative general hospitals in Michigan as of December 1958 was \$34.08, as computed by the Michigan Hospital Association. One of the northern counties in our State has an agreement with a large local general hospital to pay a flat rate of \$25.86 for the county's indigent patients. This county has recently constructed a new medical care facility as an annex to the general hospital. The estimated average cost in this institution will be \$8.90 when the institution reaches its capacity of 90 patients. It should be emphasized that this cost includes only ordinary medical, laboratory, X-ray, physiotherapy, and similar services. It can be seen readily that the cost of caring for such patients will be considerably reduced as soon as they can be transferred from the general hospital to the medical care facility.

The State social welfare department reports that average per diem costs in a medical care facility range from \$5 to \$12.50, depending primarily on the geographic area of the State where the facility is located and the type of care offered. The average cost in 1958 for all medical care facilities in Michigan was \$7.28, excluding depreciation. Most of these facilities would compare with a skilled nursing home with respect to services. A few facilities have physical and occupational therapy in addition to ordinary services.

As of this date, the average per diem costs of chronic disease units operated in cooperation with tuberculosis sanatoriums are:

<i>Chronic disease unit</i>	<i>Per diem cost</i>
Sunshine Hospital, Grand Rapids-----	\$17.73
Saginaw County Hospital, Saginaw-----	15.00
American Legion Hospital, Battle Creek--	14.74

These costs approximate 50 percent of local general hospital costs.

A recent survey in the State revealed the following costs in nursing homes of the skilled category:

<i>Nursing homes</i>	<i>Per diem cost</i>
40-bed home (all private patients)-----	\$8.11
41-bed home ($\frac{2}{3}$ private, $\frac{1}{3}$ public aid)--	5.71
86-bed home ($\frac{3}{4}$ private, $\frac{1}{4}$ public aid)--	7.25
75-bed home ($\frac{2}{3}$ private, $\frac{1}{3}$ public aid)--	5.55

Conclusion

It is generally agreed that patients with long-term illness and disability usually can be given the best care in chronic disease hospitals or annexes attached or immediately adjacent to general hospitals. However, this ideal situation appears unattainable in most areas within the foreseeable future.

Most States have facilities, such as portions of general hospitals, nursing homes, or tuberculosis hospitals, that can be converted and used eventually as institutions for the care of the chronically ill under most circumstances, if the institutions are located in an area where medical specialty services and trained staff are available.

Although the average tuberculosis hospital is by no means ideal as a chronic disease unit, it can be an acceptable substitute until such time as specially built chronic disease hospitals can be financed and constructed.

The Geriatric Program In Santa Cruz, Calif.

As a means of improving the health status and good health potential of recipients of old age security payments in Santa Cruz, Calif., a physical screening program has been in operation since September 1955. It is a voluntary

Based on a paper by Russell S. Ferguson, M.D., health officer, Santa Cruz County, Calif.

program which retains the traditional association of private physician and patient, permitting personal preference to be the determining factor in the patient's selection of physician and hospital, when required. The objective is to encourage early diagnosis and treatment, thus reducing long-term institutional care.

Santa Cruz County is situated on the coast adjacent to the San Francisco Bay area. It comprises about 400 square miles between the coastal range of mountains and the Pacific Ocean. The population is approximately 75,000; of these, 1 in every 7 is over 65 years of age, about 10,000 persons. From 1955 through 1959, a little over one-third of these 10,000, or an average monthly caseload of 3,416, were recipients of old age security. In 1955, women outnumbered men two to one and the median age for men was 76, for women 75. The median age to receive OAS was 68.

Of 58 counties in California, 38 maintain a full-time health department and Santa Cruz is one of these. The primary public health center is located in the city of Santa Cruz, the county seat, and a secondary office supplying all services is maintained in Watsonville at the southern end of the county, 18 miles away. There is no regular transportation in the county, which poses a problem in the administration of any public health program but especially one dealing with the aged.

Early in 1955, the Santa Cruz Health Department sought the cooperation of the county welfare department in an effort to ascertain what could be accomplished to improve the health status of OAS recipients. At the same time, we sought, if possible, means to reduce costs by introducing a program designed to accomplish early diagnosis and immediate treatment, thereby maintaining the recipient in sufficiently good health so that long-term institutional care might be greatly reduced.

Following this initial inquiry into the problem, the California State Department of Public Health, specifically Dr. Lester Breslow, chief of the bureau of chronic diseases, was requested to make a study of the health status of OAS recipients in Santa Cruz County. This study indicated that a two-pronged attack, with a physical screening program on a voluntary

basis, and second, with an effort to mobilize every available financial and community resource to insure immediate and complete treatment, might accomplish the desired results.

From September 1955 until September 1956, the screening program was confined to new recipients who had been processed by the welfare department in the Santa Cruz area. In October 1956, the program was expanded to include recipients previously on the rolls, and a second clinic was opened in Watsonville for OAS recipients in that area. Through August 1959, 1,501 physical examinations had been given, nearly one-half the average enrollment of 3,416 OAS recipients in the county.

Each examination consists of a careful history and a physical examination which includes a chest X-ray, electrocardiographic examination, and routine and special laboratory studies, augmented by a complete dental examination and measurement of eye tension for glaucoma. Each examination takes one-half hour.

The geriatric clinic is staffed by a physician who conducts the history-taking and physical examination, a public health dentist, public health nurse, and a social worker. Laboratory, X-ray, and electrocardiographic technicians are available for the three clinics held each week. In addition, a radiologist and internist from the county medical society read the X-ray films and electrocardiograms.

Dr. Elbert T. Rulison, although retired, serves voluntarily and without reimbursement as our physician. The county health department supplies the public health dentist, public health nurse, social worker, and technicians. The radiologist and internist may be said to contribute their services, since they receive only a very small honorarium.

A report of the results of the examination is sent by mail directly to the physician named by the recipient and includes a copy of the electrocardiograph, laboratory, and X-ray reports. Subsequently, the public health nursing service follows through to assure that the recipients are receiving medical care.

The so-called ineligible spouse, ineligible only because of being under the age of 65, constitutes a medical liability if neglected. The inclusion of these "ineligible" spouses in the program is provided under the regulations of

the California State Department of Public Welfare. If they live to the age of eligibility, they become OAS recipients in any case, and it is considered more economical to safeguard their health at this juncture, by screening them for physical defects along with their eligible spouses.

Acceptance

Acceptance of the program among new recipients in the Santa Cruz area during the first year of operation was 72 percent. In 1958, the rate of acceptance for new recipients throughout the county had declined to 57.3 percent.

A major factor in this decline was the passage of the State medical care program in October 1957. California established its medical care program after passage in 1956 of amendments to the public assistance titles of the Social Security Act. These amendments provided that the Federal Government would match, on a 50-50 basis, State expenditures on vendor payments in behalf of public assistance recipients needing medical care up to a maximum determined by multiplying \$6 per month times the number of adults and \$3 per month times the number of children.

Other factors limiting the acceptance rate are the lack of transportation mentioned previously, the more or less rapid turnover of workers in the welfare department, and our own limitations in time and personnel. I am not at all sure, however, that we should seek a much higher rate of acceptance; our ability to give each recipient ample time for thorough study might be curtailed as a result.

Financial Resources and Cost Comparisons

The cost of each examination as determined by the field auditor in the State controller's office was \$25.28 for the fiscal year 1957-58. In fiscal year 1958-59, it was a few cents higher, due to increases in the cost of services. It must be noted that if a physician had to be employed by the clinic, the cost would be at least \$5 more per examination.

The State department of social welfare advised us officially early in the program that

the cost of the screening examinations would be a proper charge against the welfare department's administrative fund. This fund is one-half Federal and one-half county money. Thus one-half of the cost of the screening program is obtained from Federal funds.

The county board of supervisors approved \$12,000 in the budget of the health department to assist in the treatment phase of the program, since it was realized that, in addition to the basic grant and excess income of the recipients, funds were required to supply medical services for conditions disclosed by the physical examination, when the recipient was unable to pay.

In the first year of operation, health department funds were used to supply care by a physician, through home and office visits, and drugs. With the passage of the State medical care program in 1957, the department switched its emphasis to surgical and dental services excluded from the State program. In addition, hearing aids, eye glasses, and other prosthetic devices were supplied. These services are given to any OAS recipient or ineligible spouse, whether he attends the geriatric clinic or not. The cost of these services in fiscal year 1958-59 equaled approximately the \$12,000 budgeted for treatment services by the health department.

The per capita cost of providing surgery, dental care, and ancillary services for the entire average roll of 3,416 recipients was 16 cents per recipient per month in 1958 and 21 cents per recipient per month in the first 6 months of 1959. Under the program, 21 surgeons have performed 37 major operations and 6 minor procedures. As might be anticipated, cataracts and genitourinary conditions lead the list of operations.

Not less than \$25,000 per month is expended on long-term institutional care for OAS recipi-

ents in Santa Cruz County. In contrast to these figures, of 664 recipients examined in the geriatric clinic prior to December 1957 for whom complete records are available, only 17 have ever been in a boarding or nursing home in the past 40 months. The total time in such homes was 174½ months; the total cost was \$19,966. This is over \$5,000 less than the cost of the entire OAS enrollment for 1 month alone.

Eleven ineligible spouses were examined at our clinic prior to 1957, and a total of \$1,650.41 was spent for home and office visits by physicians, and for drugs, surgery, dentures, and appliances. Of these, five spouses have since become eligible recipients under the OAS program and have entered the roll in good health.

Conclusions

We conclude that some important results have been achieved in Santa Cruz County as the result of our approach to the problem of the aged. First, an increased interest by the individual in maintaining his own health was achieved by the examination and immediate referral to the physician of his choice. Second, we have been able to mobilize financial and community resources, thus making it possible for the vendors of medical, dental, and ancillary services to assist the OAS recipients in maintaining good health status. Third, we have been able to restore these people to the dignity of private patients in private hospitals for surgical care, resulting in impressive savings to the county. And finally, we are convinced that these services can be given at exceedingly low cost, contributing to the prevention of long-term illness requiring institutional care and to the prevention of blindness.

Airport Sanitation

LOUIS F. WESTBROOK and ELIZABETH REED

AT the new International Airport in Miami, Fla., the Dade County Health Department has assigned to full-time duty a sanitarian, Martin Donovan, with as much responsibility for the health, comfort, and safety of the passengers as any pilot, monitor, stewardess, or ground crew. The airport is believed to be the only one in the United States with a sanitarian on duty full time.

Sanitation services were considered early in the planning of the airport by the Dade County Port Authority, established in 1945.

Even before the opening of the airport, in December 1958, Donovan spent half of his time on the installation and operation of the aircraft catering kitchens and the facilities for storing, preparing, and serving food for employees and other patrons.

Description of the Terminal

The field, on 3,000 acres in the northwest corner of Miami, handles 10 percent of all the air traffic in the Nation. During peak seasons, it employs between 25,000 and 30,000 people. In 1959 its 74 gates in 6 loading and unloading piers admitted 4,248,064 passengers, 19,020,336 pounds of airmail, and 206,273,548 pounds of express and freight. Lines using the airport included 7 domestic and 26 international carriers, 34 irregular carriers, 2 scheduled air

taxis, and 1 irregular air taxi. At peak periods, the control tower handles as many as three plane movements in 1 minute.

The new terminal building and new airport facilities so far have cost more than \$26,435,000. The complete planned program is expected to cost more than \$8,000,000 more. A road network within the airport has cost over \$3,500,000. Directional signs alone have cost \$57,500.

The seven-story terminal, entirely air-conditioned, is topped by a control tower. It provides passenger service areas and administrative offices on the first two floors. The next five floors house port authority, airline, and governmental administrative offices as well as radar control equipment areas. The Airport Hotel, five floors of hotel space with 250 rooms, is a separate building which fronts the terminal and has the second level overhang of the terminal as its foundation.

Three completely independent generators, all underground, supply electricity. The load automatically shifts from one to the other in event of power failure. In the unlikely possibility that all three should fail simultaneously, small generators, capable of operating indefinitely, will take over emergency functions.

On the ground floor of the terminal building, central control boards constantly record and analyze the electrical system and warn of impending functional difficulties.

An indirect expansion system of air conditioning regulates temperature automatically throughout the building. Chilled water, circulated through miles of concealed pipes, blows to more than 100 individual units distributing cool air.

An underground system of fuel hydrants feeds either jet or conventional engine fuel at

Mr. Westbrook is director, sanitation division, Dade County Department of Public Health, Fla. Miss Reed is director of the division of health information, Florida State Board of Health.

Mr. Alan Stewart, port authority director, Dade County Port Authority, supplied port authority statistics for use in this paper.

the rate of 25,000 gallons per hour to aircraft waiting on the ramp.

Sanitation in the Jet Age

Two sets of triturators are manned from 8:00 a.m. to 5:00 p.m., the peak periods for discharge of waste collected by soil carts from aircraft. Triturator rooms are used exclusively for emptying, cleaning, and chemical treatment of soil trucks and portable soil buckets. Triturator rooms receive hot and cold water from Clayton flotation tanks under pump pressure. A physical air break between the city water service line and the feeder for the flotation tanks eliminates any possibility of contamination of the city water supply through back siphonage.

All garbage and waste are stored in metal flytight, leakproof, rollaway containers, in sizes varying according to need. Garbage and waste at present are picked up and hauled away once or twice a day by three private contractors, under supervision of the waste division of Dade County. Additional control is also vested in the county health department and the port authority.

Potable water is fed to planes from spigots on the ramps, either through water carts or through direct hose connections to the aircraft watering system. The spigots are restricted to this use only and are so labeled.

Early Planning

As plans for the terminal were in their closing phase, the county health department requested that blueprints be submitted to it for examination by the various agencies concerned. A series of meetings were then held jointly by the Public Health Service, Florida State Board of Health, Dade County Health Department, Florida State Hotel and Restaurant Commission, Dade County Building, Zoning and Plumbing Department, and the architects.

As a result of the study by these groups, several changes and modifications were effected in the types of sanitary construction. The plans, revised according to these recommendations were then resubmitted in triplicate to the Public Health Service, the State board of health, and the county health department.

After construction was underway, the county health department director assigned Donovan to the terminal on a part-time basis. He daily examined plumbing installations, equipment installation in the triturator rooms, employee and public restroom facilities, food and beverage installations, airline servicing areas and intended watering points, ventilation and air-conditioning systems, as well as other phases of construction that related to public health and safety.

Any deviation from the plans or the codes covering the construction as it related to health and safety aspects was called to the attention of either the architect or the contractor or both.

Shortly before the formal opening of the new building in December 1958, the county health department assigned the sanitarian to full-time duty at the airport. This duty extends beyond responsibility for assuring that waste disposal, potable water supply, catered airline meals, meals for airport employees, and removal of wastes from aircraft chemical toilets and other facilities are operated without hazards to health and safety. It is concerned also with health cards for food handlers; rodent and insect control; animal quarantine; inspection of aircraft galleys, public drinking fountains, restaurant dishwashing and glass-cleansing equipment, and frozen food storage; vigilance against contamination of water supply; and intermittent emergencies.

Sanitarian on the Job

The airport sanitarian applies two codes. The first, the Florida State Sanitary Code, governs retail establishments in the terminal and the Consumer Service Building as well as the Airport Hotel, and restaurants, lunchrooms, cafeterias, juice stands, and liquor bars. The State code also permits control of insect and rodent problems, public and employee restroom facilities in the terminal and on the airport, sewage and waste disposal, and public water supplies.

The second is the "Handbook of Sanitation for Airlines" (PHS Publication No. 308) which notes provisions of Public Health Law 410 for the prevention and the spread of communicable diseases in interstate commerce.

Under this law, the sanitarian inspects and certifies catering companies that supply aircraft. He sees that the removal and handling of sewage and other refuse from aircraft is satisfactory. He protects the servicing areas for aircraft, especially watering points, and he inspects the maintenance and condition of aircraft water systems, galleys, and restrooms.

For example, a refurbishing company received an order to install galleys in some new prop-jet aircraft. The manufacturer installed the equipment in the first plane without submitting the plans to the Public Health Service regional office, as the contract specifically directed. When installation was completed, the airport sanitarian was requested to inspect it. He reported that the construction failed to meet requirements for easy cleaning and left many areas open to insect harborage and breeding. The manufacturer was ordered by the Service to rework the installations and bring them up to the required specifications.

The county health department and the airport sanitarian work closely with the regional office of the Public Health Service at Atlanta, particularly with respect to plans for new equipment to be used for food or beverage service aboard aircraft or in flight catering kitchens, and new equipment used in servicing aircraft drinking water systems or toilet systems. The airport sanitarian provides on-the-spot reports for the Public Health Service. He also obtains plans or designs for this type of equipment from the manufacturer or the operator and forwards them to the regional office for comment, recommendations, or approval.

The sanitarian reports through local and State channels to the regional office of the Public Health Service on certification inspections. These reports cover two specific activities: airline catering points sanitation, and airline servicing area sanitation. Inspections include the premises and procedures in places furnishing inflight meals and other food services to airline passengers and personnel; the removal of sewage and other wastes from the planes; and the general sanitation of the servicing area, including the potable water transfer and storage.

When Donovan finds that sanitary regula-

tions are being violated, the Public Health Service is notified. If the violator is a supplier for the airlines, the regional office then notifies all carriers concerned by telephone or telegraph. After the violation has been corrected, the airlines are notified again. Periodic inspections determine whether certified suppliers remain on the Interstate Carrier Classification List.

Typical of Donovan's relations with other regulatory agencies was his survey, conducted with the Dade County Building and Zoning Department, to find and correct plumbing faults. The survey located 115 cross connections, for the most part submerged inlets in the aircraft plating shops. These hazards in acid and dye vats posed a threat of back siphonage to the municipal water supply. The cross connections were corrected by physical air breaks where possible or by installation of approved vacuum breakers and introduction of air under pressure where needed for agitation in the tanks.

Management Relations

The following is a practical example of working relationships between the airlines and the county health department. Donovan objected to the drinking water facility in the aft galley of one model of aircraft. The plastic tubing used in transferring drinking water from the galley portable water container through the water spigot was fixed so as to obstruct cleaning and sanitation. At the same time, handling of the tube as it was threaded to the water container invited contamination.

It was suggested that the airline explore the possibility of using single service tubing, as on bulk milk dispensers. After discussion with the airline chief of food and catering service and the project engineer, the engineering department designed a spring tension clip-type handle to be used in connection with single service tubing and a model has been ordered for testing. If the tension spring clip operates satisfactorily in flight, the airline will convert all water containers in question to single service tubing.

Complaints by the public or employees concerning sanitary matters are reviewed by the director of the port authority, his staff, and the

sanitarian. The airlines personnel confer with Donovan on matters pertaining to aircraft galley construction, potable water trucks, soil carts and trucks, food and drink equipment used in aircraft galleys, hygiene for personnel, and food employees' food handler training programs, as related to such service aboard aircraft.

Full-time duty at the airport goes a long way to curb or prevent deliberate violations of sanitary practice by persons intent on shortcuts, whether motivated by the demands of peak traffic conditions or by a misguided sense of economy. Donovan's surveillance, characterized by daily visits, is supplemented by occasional visits on nights, Sundays, and holidays.

The informal reporting of insanitary conditions by employees is a valuable adjunct to airport sanitation, whether it concerns defective locks on toilet stalls or industrial hazards in aircraft maintenance and overhaul hangars. The nine terminal supervisors and the ramp supervisors also are alert to sanitation practices and conscientious about them.

Donovan has public education duties, too, as when he is requested by Consumer Service Building tenants to be a member of the welcoming committee at formal openings. His task is to acquaint the public with the sanitation features of the particular establishment being featured and of the terminal in general. He also consults with the representatives of the various unions representing organized labor employed at the airport.

Occasionally he acts as a guide, particularly on tours to flight kitchen operations.

When Donovan learns of protracted delays in flights owing to mechanical or weather conditions, and when high temperatures indicate possible spoilage of food without refrigeration, he orders food removed and replaced.

On one occasion, he observed and reported mosquito breeding on a roof area of the new terminal. Faulty construction had prevented drainage. The port authority corrected the condition.

The three main groups dealt with in respect to the airport sanitation, the terminal management, the airlines, and the tenants of the terminal, offer abundant evidence of their cooperation with the county health department.

The terminal management leases each of the two sets of triturator rooms to separate aircraft servicing companies operating on the field. In the contract it inserted at the request of the health department a requirement that each set of rooms have an attendant on duty for cleaning them and assisting operators of soil carts in dumping. Rooms are manned between peak hours of 8:00 a.m. to 5:00 p.m.

The port authority maintenance department promptly removes any rodent, fly, or mosquito breeding area on discovery by the health department.

Port authority regulations accept health department standards regarding the type and construction of garbage and rubbish hauling and storage equipment and mobile industrial feeding vehicles.

The management submitted for review by the health department the contract leasing concession for the cleaning and maintenance of the public areas of the terminal.

The management requires food and drink concessionaires to seek a health department review of their plans before they set up for business. It consults with the health department on all new or added construction.

The airline companies requested assistance of the county health department in the construction and design of potable water carts, potable water transferral systems, soil carts, food and drink equipment for aircraft use, and the sanitary maintenance of watering points and servicing areas.

Food and drink establishments bring in plans for construction and installation of equipment, and work with the department in training food handlers.

Unfinished Business

With an eye to future developments and to the principles of design and operation of airports, the following needs are indicated:

- Toilet facilities adequate for employees on the baggage concourse and on the piers.
- Storage space for supplies and equipment used by terminal cleaning contractors, a locker room for employees of the cleaning contractor, and convenient toilet facilities for such employees.

- Floor level waste basins to receive waste water from mops and heavy duty cleaning, in the absence of sewers.
- Hose bibs and drinking fountains along the baggage concourse.
- Hose bibs on ramps opening to ground transportation.
- Toilet facilities convenient for drivers in the taxicab pool.
- Suitable methods of moving garbage and waste from upper level to lower level holding and storage area.

- Facilities convenient for washing and sanitizing waste receptacles from aircraft galleys.
- A means of barring stray dogs from the airport and terminal buildings, and of barring all dogs, except Seeing Eye dogs, from eating and drinking places.
- Suitable food service for employees on the piers.
- A method of keeping out of the air-conditioning system the mists of oil released from jet engines. Films formed by the oil soil the terminal and contaminate the air unnecessarily.

exhibit

What's the Risk for Youngsters Who Are Tuberculin Reactors?

Practically all the complications of primary tuberculosis can be prevented by the administration of isoniazid to infants and young children who are tuberculin positive. Because of the seriousness of the complications and of the demonstrated high risk, the Tuberculosis Program of the Public Health Service is recommending isoniazid prophylaxis for those infants and young children with special susceptibility. This exhibit is one of the means by which the program is making the recommendations known to physicians concerned with child health.

The information presented is based on a control study of 2,750 children, made by the Public Health Service in cooperation with pediatricians in 33 clinics throughout the United States. The study established that for children under 4 years who have asymptomatic primary tuberculosis the risk of extrapulmonary complications is high and that isoniazid prevents almost all of these complica-



Specifications: A 3-panel exhibit on legs, fabricated of translucent Fiberglas and plywood with aluminum framing, 9 feet long, contained in 2 crates, shipping weight 440 pounds. One electrical outlet, 110 a.c., 1,000 watts, is needed for illumination.

tions. These findings as well as specific recommendations for preventive treatment are shown in the exhibit and are presented in an accompanying pamphlet which is provided free for distribution to physicians.

The exhibit is available without charge for display at national, regional, and other meetings or conferences of physicians concerned

with child health. However, it must be manned by a physician and its availability will depend on whether this service can be obtained. Shipping costs for the exhibit must be paid by the borrower.

For further information write to the Tuberculosis Branch, Division of Special Health Services, Public Health Service, U.S. Department of Health, Education, and Welfare.

Academy of Medical Sciences of the USSR

A great volume of research in medicine and biology has been built up in recent years by Russian scientists. To a considerable degree, this achievement has been due to a consolidation of effort under the auspices of the largest medical and scientific institution in the USSR, the Academy of Medical Sciences.

At present, the Academy has a staff of approximately 10,000, and its yearly budget is nearly 300 million rubles (\$30 million at the tourist rate). The research work is supervised by some 250 active and corresponding members of the Academy. Membership in the Academy is the highest scientific rank in the field of medicine in the USSR.

This monograph presents the history, organization, and functioning of the Academy, its scientific-medical background, and its progress in medical research, covering the 15 years from the Academy's founding in 1944 to 1959. The chapter on organization describes the structure of the Academy of Medical Sciences and its relationship to the Ministry of Health and other organizations. It tries to make clear the internal organization of the departments, institutes, and administrative bodies.

The Academy's policies regarding personnel,

training and degrees, academic standing, and salaries are discussed to the extent that it was possible to gather information from Soviet and other sources. In addition to describing the administration and organization of the Academy, this monograph aims to show the chief areas of medical research in which it is engaged.

The Soviet Government, which finances and controls all scientific work in the USSR, relies to a great extent on plans prepared by the Academy. Its objectives for the Academy under the current 7-year plan, as presented by the Soviet press, are discussed.

Appendixes list all research institutes of the Academy as of January 1959, with locations and names of the directors, and provide a directory of all active and corresponding members of the Academy, giving the dates of their birth and election to the Academy, respective areas of research, and location.

This study is intended for physicians, medical workers, and others interested in the organization of medical research in the Soviet Union. Although it is based primarily on Soviet sources, American and other literature was also consulted. A special effort has been made to bring all information as up to date as possible.

Public Health Monograph No. 63

Academy of Medical Sciences of the USSR, History and Organization, 1944-59. By Galina V. Zarechnak. Public Health Monograph No. 63 (PHS Pub. No. 702), 48 pages. U.S. Government Printing Office, Washington, D.C., 1960.

The accompanying summary covers the principal contents of Public Health Monograph No. 63, published concurrently with this issue of *Public Health*

Reports. The author is with the National Library of Medicine, Public Health Service.

Readers wishing the data in full, official agencies, and others directly concerned may obtain single sample copies without charge from the Public Inquiries Branch, Office of Information, Public Health Service. Copies will be found also in the libraries of professional schools and the major universities and in selected public libraries.

Mortality and Economic Level in an Urban Area

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DURING the past century the association between mortality and economic status has been investigated repeatedly, and the same general conclusion has been reached—that the rate of mortality tends to vary inversely with the economic level of the community or population. Concomitantly, it has been believed and often demonstrated that morbidity also varies inversely with economic level. Within the past 5 years, however, at least three studies have been reported which suggest that the relationship no longer holds with respect to total illness. Graham, using occupation as the index of socioeconomic status, found no difference in the incidence of illness among six classes within Butler County, Pa., in 1954 (1). Laughton and associates made a similar observation among families of Windsor, Ont. Here families were classified into three groups according to the median rental of the census tract of residence, and illnesses were recorded for some 2-year period during the time between January 1948 and June 1953 (2). The third study compared families known to a public agency for reasons other than ill health with the remaining families of a community. Although members of the first group were of lower occupational status and educational attainment than members of the second group, they did not experience a greater incidence of illness in May 1952 or of hospitalization during the previous year (3).

In view of the reports that contradict the tra-

ditional inverse relationship with respect to illness, the study reported here and based on the examination of the 1940 and 1950 mortality among white residents of Pittsburgh, Pa., may be of some interest. This study contains no evidence that an inverse relationship no longer exists between economic level and mortality, but it does suggest a possible association of mortality with changes in the relative economic levels of residential areas.

Many of the published reports of the association between economic status and mortality have been based on the characteristics of the population in some geographic unit in which the decedent lived. Illustrative studies are those of Dorn (4), Altenderfer (5), and Lilienfeld (6). Dorn used counties as the basic geographic unit; Altenderfer used cities of at least 100,000; and Lilienfeld used census tracts. This study also employs the census tract as the basic unit.

Relative Economic Levels

The 1940 white population was subdivided into three economic groups, in the following manner. The census tracts, ranging in population from fewer than 100 to more than 10,000 white persons, were ranked in ascending order of the median value of owner-occupied units (7). The 55 tracts with the lowest values were preliminarily designated as of lowest economic status, the next 69 tracts as of medium status, and the remaining 70 tracts as of high economic status. Each group contained approximately one-third of the white population of Pittsburgh. Using the median monthly rental as the index of economic status, the procedure was repeated and the two results compared (table

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1). When home value and monthly rental indicated the same relative level (155 tracts with 81 percent of the population), the tract was assigned that position. When the two indices indicated different levels (39 tracts with 19 percent of the population), the tract was assigned the level indicated by the index based on the greater number of units. For example, if owner-occupied units outnumbered tenant-occupied units, the tract was assigned the level obtained when the median home value served as the index. When tenant-occupied units outnumbered owner-occupied units, the tract was classified according to the level indicated by the median monthly rental. The final classification was:

<i>Economic status</i>	<i>Census tracts</i>	<i>Population</i>
Low -----	59	197, 884
Middle -----	66	206, 530
High -----	69	204, 822

The subdivision of the 1950 population was carried out in a similar manner but with one additional index—median family income (8). The levels of 83 tracts with 48 percent of the population were determined by all three indices indicating the same level. For 104 tracts with another 48 percent of the population, 2 of the 3 indices indicated the same economic level, and the tracts were so assigned. The remaining seven tracts were designated as being of medium economic status. The final result was:

<i>Economic status</i>	<i>Census tracts</i>	<i>Population</i>
Low -----	70	199, 647
Middle -----	62	196, 396
High -----	62	197, 782

Table 2. Number of census tracts in Pittsburgh, Pa., by relative economic level, 1940 and 1950

1940	1950			Total
	Low	Middle	High	
Low-----	48	9	2	59
Middle-----	21	38	7	66
High-----	1	15	53	69
Total----	70	62	62	194

All but 55 of the tracts had the same relative classification in 1950 as in 1940. For 52 of these that "changed," the 1950 classification was one step from the 1940 classification. Two tracts were classified in the lower third in 1940 and in the upper third in 1950. One tract "changed" from the upper third in 1940 to the lower third in 1950 (table 2).

In later comparisons, the one tract which in 1940 was in the upper third but declined to the lower third in 1950 was combined with the 21 tracts that were of the middle third in 1940 but of the lower third in 1950. The 1940 population of this tract was 860; the 1950 population, 850. Similarly, the 2 tracts, with a combined population of 2,554 in 1940 and 2,924 in 1950, which were in the lower third in 1940 but advanced to the upper third in 1950 were grouped with the 7 tracts which advanced from the middle third to the upper third from 1940 to 1950.

Change in Population

From 1940 to 1950, there was a considerable shift in the white population and also a net loss

Table 1. Economic status of white population of Pittsburgh, Pa., according to value of owner-occupied homes and median monthly rental value, 1940

Value of owner-occupied homes	Median monthly rental value						Total	
	Lower third		Middle third		Upper third		Number census tracts	Population
	Number census tracts	Population	Number census tracts	Population	Number census tracts	Population		
Lower third-----	40	151, 137	15	50, 959	-----	-----	55	202, 096
Middle third-----	15	47, 495	51	148, 309	3	7, 105	69	202, 909
Upper third-----	1	1, 147	5	9, 278	64	193, 806	70	204, 231

of 2½ percent. Not all areas, however, lost population. Losses occurred only in the aggregate areas which were of middle or low economic status in 1940 and remained at these levels in 1950. The population increased in each of the aggregate areas of high economic status in 1940 or 1950 (table 3).

A "cohort" comparison of the 1940 and 1950 population within each group showed that net out-migration, rather than death, was the major reason for the observed losses. Net in-migration was evident in the three groups that increased in population.

The census tracts which were of low economic status in both 1940 and 1950 illustrate net out-migration. In 1940, there were 11,779 children under 5 years of age in these tracts. In 1950, however, there were only 9,038 children between 10 and 15 years of age in these same tracts, a loss of 23.3 percent. This loss was more than 10

times that which would have occurred through death, and net out-migration is therefore indicated. Furthermore, every 5-year age cohort showed at least a 25 percent loss in population.

In the areas with larger populations in 1950 than in 1940, there were definite indications of net in-migration of young persons. For example, in the group that rose from the middle to the high level, there was net in-migration of males who were between 25 and 40 years of age in 1950 and of females between 20 and 35 years old. Areas of high economic status in both years gained in males between 10 and 40 years of age in 1950 and in females between 10 and 30 years old. Similar gains occurred in the group which fell from high to middle economic level.

Source of Mortality Data

Mortality data were obtained from the death certificates for white residents who died within

Table 3. Population of Pittsburgh, Pa., by change in relative economic level of census tracts between 1940 and 1950

1940 level	1950 level	Males			Females		
		1940	1950	Percent change	1940	1950	Percent change
Low-----	{ Low-----	84,921	68,882	-18.9	80,717	67,549	-16.3
	{ Middle-----	15,524	14,648	-5.7	15,028	14,941	-.6
Middle-----	{ Low-----	32,955	30,977	-6.0	32,632	32,239	-1.2
	{ Middle-----	61,926	58,896	-4.9	64,115	62,365	-2.7
	{ High-----	8,775	9,731	+10.9	8,681	9,906	+14.1
High-----	{ Middle-----	18,641	21,395	+14.8	21,484	24,151	+12.4
	{ High-----	76,049	83,432	+9.7	87,788	94,713	+7.9

Table 4. Deaths in 1957 among white residents of Pittsburgh, Pa., by place of occurrence and economic level in 1950

Place of death	Economic level of census tract, 1950					
	Low		Middle		High	
	Number	Percent	Number	Percent	Number	Percent
All places-----	2,380	100.0	2,060	100.0	2,229	100.0
Within the city-----	1,950	81.9	1,716	83.3	1,904	85.4
Outside the city-----	430	18.1	344	16.7	325	14.6
Within the county-----	385	16.2	291	14.1	243	10.9
In State and county institutions-----	333	14.0	196	9.5	125	5.6
Other-----	52	2.2	95	4.6	118	5.3
Other counties in Pennsylvania-----	30	1.3	31	1.5	37	1.7
Other States-----	15	.6	22	1.1	45	2.0

the city. These, then, did not represent all deaths among white residents, and it was necessary to assume that the degrees of incompleteness were the same for all economic groups. Data for more recent years on all resident deaths suggest that this may not have been an unreasonable assumption.

With the 1950 classification of census tracts being used, complete mortality data for 1957 showed that deaths outside the city accounted for 18 percent of the deaths among persons of the low economic level, 17 percent of the middle group, and 15 percent of the high group. One of the reasons for this slight inverse relationship is that the county and State institutions which provide care to the indigent of the city are located outside the city limits. And while the more well-to-do may seek care in nursing homes in the suburbs or in other States, this is counterbalanced by the less well-to-do using the public institutions (table 4).

There is, therefore, the possibility that in this report mortality among the lower economic groups was underestimated by a greater amount than mortality among the population of higher economic status, thus diminishing any inverse

relationship between mortality and economic levels that might exist.

Classification of the causes of death in both years was carried out under the principles of the sixth revision of the International Statistical Classification of Diseases, Injuries, and Causes of Death.

Mortality Ratios

The mortality experience of each subgroup was summarized in two "expected numbers," one for males and one for females. The 1940 expected numbers were computed in three stages, one for all persons under 40 years of age, one for the native-born, and one for foreign-born persons 40 years old and over. The area's specific death rates for the age groups under 10, 10-29, and 30-39 years were applied to the city's population, giving an expected number of deaths for persons under 40 years of age. The second and third expected values were obtained by applying the age-specific death rates for the age groups 40-49, 50-59, 60-69, and 70 and over to both foreign-born and native-born populations. Finally, the three expected values were summed, with the total becoming the expected number for the subgroup.

Table 5. Standardized mortality ratios among white residents of Pittsburgh, Pa., by economic level, 1940 and 1950

Sex and age (years)	Economic level						Total deaths in city	
	1940			1950				
	Low	Middle	High	Low	Middle	High	1940	1950
<i>Males</i>								
All ages	1. 11	0. 97	0. 93	1. 13	0. 99	0. 88	3, 447	3, 103
Under 10	1. 14	. 98	. 84	1. 19	1. 05	. 73	287	230
10-29	1. 13	. 86	1. 02	. 95	1. 16	. 90	169	61
30-39	1. 43	. 88	. 73	1. 48	. 83	. 64	154	84
40-49	1. 17	1. 14	. 67	1. 31	. 85	. 85	337	272
50-59	1. 23	. 89	. 93	1. 23	1. 04	. 75	652	534
60-69	1. 08	. 97	. 98	1. 08	. 98	. 92	843	872
70 and over	. 99	. 98	1. 03	1. 04	. 98	. 97	1, 005	1, 050
<i>Females</i>								
All ages	1. 14	1. 00	. 93	1. 06	1. 05	. 91	2, 853	2, 528
Under 10	. 91	1. 03	1. 07	1. 01	. 85	1. 16	183	159
10-29	1. 07	1. 14	. 80	1. 00	1. 12	. 87	122	58
30-39	1. 13	1. 02	. 88	1. 27	. 96	. 77	139	88
40-49	1. 27	1. 01	. 81	1. 18	1. 21	. 68	246	160
50-59	1. 65	. 92	. 79	1. 23	. 99	. 84	384	331
60-69	1. 20	. 99	. 93	1. 13	1. 03	. 87	662	566
70 and over	1. 03	1. 00	1. 00	. 97	1. 09	. 95	1, 117	1, 166

The distinction between foreign-born and native-born in the handling of the 1940 data was made for three reasons. First, the age-specific rates for the foreign-born were higher than those for the native-born; second, the foreign-born constituted one-third of the population 40 years of age or older; and third, the foreign-born were not equally distributed among the three economic levels.

The 1950 data did not permit the separation of foreign- and native-born since the age distribution of the two groups was not published by census tracts. (In 1950, less than 15 percent of those 40 years old or older were foreign-born.) Therefore, the 1950 expected numbers for a subgroup were obtained by applying the age-sex specific rates to the city's population, without consideration of country of birth.

Once an expected number of deaths for a subgroup was obtained, it was related to the observed number of deaths in the city as a whole. The resulting ratios are the bases of many of the comparisons presented. Other comparisons are presented in terms of the ratios obtained from relating the age-specific rate for a subgroup to the corresponding age-specific rate for the city.

Mortality and Economic Level

In both 1940 and 1950, an inverse relationship between economic level and mortality was found (table 5). In general, the highest mortality occurred among persons within the areas designated as being of low economic level, and the most favorable experience was found among the residents of the areas of high economic

Table 6. Mortality ratios among white residents of Pittsburgh, Pa., by cause of death and economic level, 1940 and 1950

Cause of death	Economic level						Total deaths in city	
	1940			1950				
	Low	Middle	High	Low	Middle	High	1940	1950
<i>Males</i>								
All causes	1. 11	0. 97	0. 93	1. 13	0. 99	0. 88	3, 447	3, 103
Tuberculosis	1. 65	. 77	. 51	1. 70	. 98	. 30	121	71
Other infective and parasitic diseases .....	. 99	1. 10	. 90	1. 04	1. 14	. 82	40	19
Malignant neoplasms	1. 05	. 99	. 99	1. 02	. 92	1. 05	383	426
Diabetes	1. 28	1. 04	. 73	1. 10	. 89	1. 02	69	47
Diseases of the nervous system and sense organs .....	. 99	. 94	1. 06	1. 01	. 91	1. 07	344	321
Diseases of the circulatory system .....	. 95	1. 00	1. 05	1. 05	1. 04	. 92	1, 321	1, 372
Diseases of the respiratory system	1. 23	1. 13	. 68	1. 67	1. 02	. 25	261	94
Diseases of the digestive system	1. 38	. 75	. 94	1. 28	. 82	. 86	200	135
Diseases of the genitourinary system	1. 10	1. 00	. 85	. 92	1. 04	1. 06	111	74
Accidents	1. 46	. 92	. 71	1. 29	1. 00	. 71	236	141
Suicide	1. 25	. 95	. 81	. 91	. 69	1. 39	51	45
Homicide	1. 12	1. 10	. 92	. 71	1. 57	. 74	11	8
All other	1. 25	. 89	. 88	1. 41	. 98	. 58	299	350
<i>Females</i>								
All causes	1. 14	1. 00	0. 93	1. 06	1. 05	0. 91	2, 853	2, 528
Tuberculosis	1. 25	. 89	. 94	1. 56	. 85	. 65	68	36
Other infective and parasitic diseases	1. 84	. 97	. 56	. 90	. 65	1. 44	18	14
Malignant neoplasms .....	. 94	1. 00	1. 06	. 90	1. 09	1. 00	383	437
Diabetes	1. 56	1. 00	. 68	. 92	1. 13	. 97	94	83
Diseases of the nervous system and sense organs	1. 10	1. 05	. 91	1. 14	. 92	. 96	363	396
Diseases of the circulatory system	1. 08	1. 00	. 96	1. 07	1. 08	. 88	1, 158	1, 068
Diseases of the respiratory system	1. 12	1. 06	. 90	1. 39	1. 07	. 63	232	52
Diseases of the digestive system	1. 33	. 97	. 84	1. 23	1. 18	. 64	131	103
Diseases of the genitourinary system	1. 48	1. 23	. 47	1. 40	. 99	. 65	84	41
Accidents	1. 42	. 88	. 80	1. 07	1. 21	. 76	88	64
Suicide .....	. 51	. 77	1. 32	1. 16	1. 34	. 52	12	16
Homicide	1. 20	1. 03	. 77	2. 64	. 60	. 00	3	5
All other	1. 25	. 83	. 99	. 98	1. 00	1. 03	219	213

status. Exceptions to the inverse relationship were found in several of the age groups, the most noticeable, in both 1940 and 1950, being that of childhood mortality among females. The highest mortality among females under 10 years of age occurred in the areas of high economic status.

Causes of death which followed the pattern of the overall ratios in both 1940 and 1950 were tuberculosis (male), diseases of the respiratory system (male and female), diseases of the digestive and genitourinary systems (female), and accidents among males (table 6). The frequency of these causes of death have at one time or the other been found to be related to economic status.

When the populations of the two extreme economic levels were compared, that is, the low with the high, there was no question that the former demonstrated the greater mortality. With but two exceptions, females under 10 years of age in both 1940 and 1950 and males 70 years old and older in 1940, all age-specific death rates were higher in the low economic

group. In 1950, the greatest relative differential was observed for males in the age group 30-39. The death rate in the low economic group was 2.8 per 1,000 and exceeded that in the high group by 135 percent. The next highest relative differential was among females 40-49 years of age, with women of the low economic group experiencing a rate of 4.6 per 1,000, 75 percent above the high group. Practically all age-adjusted rates by cause of death were also higher among the populations of the poorer tracts. The few exceptions included cancer among females, the ratios being 0.94 to 1.06 in 1940 and 0.90 to 1.00 in 1950. Among males, the exceptions were diseases of the nervous system and sense organs in both years, diseases of the circulatory system in 1940, and cancer and diseases of the genitourinary system in 1950.

Mortality and Change in Economic Level

Additional information on the relationship between economic level and mortality was suggested when each of the three groups of the

Table 7. 1940 mortality ratios among white residents of Pittsburgh, Pa., by age and change in relative economic level

Sex and age (years)	1940 level							
	Low		Middle			High		Total deaths in city
	1950 level		1950 level			1950 level		
	Low	Middle	Low	Middle	High	Middle	High	
<i>Males</i>								
All ages	1. 16	0. 86	1. 06	0. 95	0. 87	1. 12	0. 89	3, 447
Under 10	1. 27	. 59	1. 04	1. 01	. 45	1. 12	. 78	287
10-29	1. 08	1. 37	. 87	. 85	. 88	1. 80	. 82	169
30-39	1. 59	. 61	1. 30	. 75	. 22	1. 18	. 62	154
40-49	1. 22	. 86	1. 27	1. 11	. 88	. 74	. 66	337
50-59	1. 28	. 91	. 90	. 84	1. 33	1. 15	. 87	652
60-69	1. 11	. 86	. 99	. 96	1. 02	1. 16	. 94	843
70 and over	1. 01	. 86	1. 14	. 98	. 67	1. 07	1. 02	1, 005
<i>Females</i>								
All ages	1. 15	1. 09	. 89	1. 08	. 80	1. 18	. 86	2, 853
Under 10	. 94	. 76	. 70	1. 19	1. 10	2. 20	. 81	183
10-29	1. 11	. 90	1. 02	1. 26	. 64	1. 09	. 73	122
30-39	1. 20	. 78	. 88	1. 23	. 00	. 76	. 91	139
40-49	1. 28	1. 21	. 90	1. 04	1. 12	1. 47	. 63	246
50-59	1. 44	1. 15	. 80	1. 01	. 61	. 92	. 75	384
60-69	1. 21	1. 12	. 90	1. 07	. 82	1. 14	. 87	662
70 and over	1. 01	1. 14	. 92	1. 05	. 85	1. 11	. 97	1, 117

1940 population was subdivided by considering simultaneously both the 1940 and 1950 relative levels of each census tract.

The population of the low economic group in 1940 was divided into two components: (a) those persons who lived in tracts whose 1950 classification was also low and (b) those persons in tracts which were of higher level in 1950. Similarly, the population in the middle level group was considered in three parts: (a) persons in the areas with a low classification in 1950, (b) persons in areas of middle level in 1950, and (c) persons in areas with a high 1950 classification. Finally, the population living in areas of high economic level in 1940 was divided between those who lived in sections that were of high economic level in the 1950 classification

and those who lived in sections that were at a lower level in 1950. These seven groups have already been indicated in tables 2 and 3, and table 7 summarizes the 1940 mortality experience of the populations in the seven areas.

The most favorable experience in 1940 occurred in the areas which were to rise in relative economic level or to remain at the high level. The least favorable experience occurred in the areas which were to fall in relative economic level or to remain at the low level.

The experience of the men who lived in areas which were to advance economically in relative terms was particularly favorable, equaling that for men in the sections which ranked high in economic level in both 1940 and 1950. Much of this favorable experience was related to the

Table 8. 1940 mortality ratios among white residents of Pittsburgh, Pa., by cause of death and change in relative economic level

Cause of death	1940 level							Total deaths in city
	Low		Middle			High		
	1950 level		1950 level			1950 level		
	Low	Middle	Low	Middle	High	Middle	High	
<i>Males</i>								
All causes	1.16	0.86	1.06	0.95	0.87	1.12	0.89	3,447
Tuberculosis	1.70	1.43	1.10	.67	.40	.96	.41	121
Other infective and parasitic diseases	1.18	.00	1.43	.72	3.52	.80	.93	40
Malignant neoplasms	1.06	1.01	.87	1.04	1.29	1.05	.98	383
Diabetes	1.31	1.07	1.01	.95	2.87	1.35	.59	69
Diseases of the nervous system and sense organs	1.09	.44	.97	.92	1.18	1.25	1.00	344
Diseases of the circulatory system	.96	.85	1.04	1.02	.83	1.16	1.03	1,321
Diseases of the respiratory system	1.33	.70	1.54	.98	.80	.93	.61	261
Diseases of the digestive system	1.44	1.05	.75	.82	.25	1.08	.89	200
Diseases of the genitourinary system	1.06	1.34	.80	1.15	.71	1.05	.78	111
Accidents	1.51	1.09	1.41	.73	.35	1.15	.60	236
Suicide	1.40	.37	1.36	.70	.92	1.58	.58	51
Homicide	1.33	.00	.00	1.84	.00	1.19	.91	11
All other	1.35	.79	1.02	.86	.55	1.00	.86	299
<i>Females</i>								
All causes	1.15	1.09	0.89	1.08	0.80	1.18	0.86	2,853
Tuberculosis	1.00	2.62	1.32	.72	.72	.99	.94	68
Other infective and parasitic diseases	1.90	1.42	.43	1.28	.00	2.13	.21	18
Malignant neoplasms	.93	.98	.83	1.13	.47	1.24	1.01	383
Diabetes	1.53	1.78	1.02	1.01	.83	.80	.65	94
Diseases of the nervous system and sense organs	1.12	1.02	.88	1.11	1.28	1.00	.88	363
Diseases of the circulatory system	1.09	1.08	.89	1.09	.71	1.16	.91	1,158
Diseases of the respiratory system	1.22	.53	.86	1.14	.50	1.40	.77	232
Diseases of the digestive system	1.28	1.78	1.07	.98	.42	1.17	.76	131
Diseases of the genitourinary system	1.56	.92	.89	1.37	2.25	.64	.44	84
Accidents	1.49	1.04	.75	.87	1.65	.96	.74	88
Suicide	.36	1.43	.94	.78	.00	1.87	1.17	12
Homicide	1.43	.00	.00	1.57	.00	.00	.97	3
All other	1.30	1.00	.73	.96	.16	1.63	.84	219

fact that the lowest rates for diseases of the circulatory system were observed in these areas (ratios=0.85 and 0.83).

In the areas which were to decline from the middle level in 1940 to the low level in 1950, several causes of death among men were of interest in that they are ones usually associated with lower economic levels. First of all, the ratio for mortality from diseases of the respiratory system was the highest of all groups, even exceeding that among men of the areas that would remain in the low level in 1950 (table 8). The ratios for accidental death and suicide were also high.

With one exception, the data for females followed the pattern of males, that is, the most favorable experience was found among the residents of areas which were to advance to or remain in the upper level in 1950. The exception was among women in the areas classified in the middle level in 1940 and in the low level in 1950. While the men of these areas exhibited a mortality which was 6 percent higher than that for all men in the city, the women experienced a mortality which was 11 percent lower

than that for all women. Their advantage involved all age groups except the 10-29-year group and all causes of death except tuberculosis, diabetes, and diseases of the digestive system.

In order that the 1950 mortality could be viewed in terms of the past relative economic level of areas as well as the current relative economic level, the 1950 population was subdivided by considering both the 1940 and 1950 relative levels of each census tract. In other words, subgroups of the population and their mortality experiences were analyzed with respect to the current relative level of census tracts (1950) and the past relative level of the tracts (1940). Table 9, based on the 1950 mortality, shows ratios for each of the subgroups and again demonstrates a negative association between economic level and mortality. When compared with table 7, it also suggests that the relative level of the past is of less importance than the relative level of the future with respect to current mortality. For example, within each major group the ratios for the two or three components are more alike in table 9 than in table 7.

Table 9. 1950 mortality ratios among white residents of Pittsburgh, Pa., by age and change in relative economic level

Sex and age (years)	1940 level							Total deaths in city
	Low		Middle			High		
	1950 level		1950 level			1950 level		
	Low	Middle	Low	Middle	High	Middle	High	
<i>Males</i>								
All ages-----	1. 12	1. 14	0. 91	0. 98	1. 03	0. 98	0. 88	3, 103
Under 10-----	1. 21	1. 13	. 85	1. 21	. 71	1. 22	. 66	230
10-29-----	. 76	1. 34	. 55	1. 17	1. 51	. 45	. 95	61
30-39-----	1. 48	1. 46	1. 12	. 77	. 80	. 99	. 60	84
40-49-----	1. 33	1. 26	. 78	. 98	. 54	. 53	. 88	272
50-59-----	1. 28	1. 12	1. 33	. 88	1. 30	. 96	. 73	534
60-69-----	1. 09	1. 08	. 81	1. 01	1. 01	. 69	. 94	872
70 and over-----	1. 00	1. 13	. 83	. 97	1. 08	1. 00	. 97	1, 050
<i>Females</i>								
All ages-----	1. 04	1. 11	1. 05	1. 06	1. 02	. 97	. 91	2, 528
Under 10-----	. 88	1. 30	1. 32	. 83	. 52	. 17	1. 30	159
10-29-----	1. 07	. 87	1. 30	1. 10	1. 03	1. 06	. 85	58
30-39-----	1. 51	. 75	. 22	1. 29	. 59	. 32	. 82	88
40-49-----	1. 25	1. 05	1. 37	1. 22	1. 11	. 37	. 71	160
50-59-----	1. 17	1. 36	. 96	1. 12	. 66	. 92	. 83	331
60-69-----	1. 11	1. 15	1. 15	. 96	1. 15	1. 25	. 84	566
70 and over-----	. 93	1. 05	1. 00	1. 07	1. 15	1. 09	. 94	1, 166

Table 10 is also based on the 1950 mortality and gives added evidence that tuberculosis and diseases of the respiratory system were still good indicators of economic level in spite of their relative unimportance numerically in the total mortality picture.

Decrease in Mortality from 1940 to 1950

Between 1940 and 1950, all areas experienced a decrease in mortality rates. The decrease, however, was not at a uniform rate. In table 11, equal ratios for the years 1940 and 1950 mean a relative decrease in mortality equal to that seen in the city as a whole. Since a 1950 ratio smaller than its corresponding 1940 ratio means a decrease exceeding that observed in the

entire city, the greatest proportional decreases occurred in the two areas of highest mortality in 1940. These were (a) the areas which were of low economic level in both 1940 and 1950 and (b) the areas which were in the high level in 1940 but in the middle level in 1950. One of the smallest proportional decreases occurred in the census tracts classified at the middle level in 1940 and at the low level in 1950.

Summary and Discussion

1. On the basis of data on median home value, monthly rental, and family income by census tract, the 1940 and 1950 white populations of Pittsburgh, Pa., were divided into three economic groups referred to as the lower

Table 10. 1950 mortality ratios among white residents of Pittsburgh, Pa., by cause of death and change in relative economic level

Cause of death	1940 level							Total deaths in city
	Low		Middle			High		
	1950 level		1950 level			1950 level		
	Low	Middle	Low	Middle	High	Middle	High	
<i>Males</i>								
All causes.....	1.12	1.14	0.91	0.98	1.03	0.98	0.88	3,103
Tuberculosis.....	1.58	1.96	.95	1.16	.55	.36	.27	71
Other infective and parasitic diseases.....	1.28	.50	1.24	1.29	.63	.00	.90	19
Malignant neoplasms.....	1.09	.78	.88	.94	.91	1.34	1.03	426
Diabetes.....	1.15	.97	1.52	.88	.57	.00	1.12	47
Diseases of the nervous system and sense organs.....	1.01	1.01	1.18	.85	.97	.91	1.09	321
Diseases of the circulatory system.....	1.05	1.05	.83	1.00	1.24	.96	.92	1,372
Diseases of the respiratory system.....	1.73	1.52	2.56	.90	.41	.34	.24	92
Diseases of the digestive system.....	1.53	.73	1.16	.72	.88	.28	.92	135
Diseases of the genitourinary system.....	1.06	.60	.23	1.17	1.08	.55	1.10	74
Accidents.....	1.07	1.77	.55	1.28	.56	1.10	.66	141
Suicide.....	.66	1.43	.60	.67	.89	.72	1.46	45
Homicide.....	1.00	.00	2.65	1.90	.00	.00	.80	8
All other.....	1.21	1.84	.56	1.07	1.00	.58	.57	350
<i>Females</i>								
All causes.....	1.04	1.11	1.05	1.06	1.02	.97	.91	2,528
Tuberculosis.....	1.53	1.64	.92	.97	.35	.94	.64	36
Other infective and parasitic diseases.....	.65	1.42	1.74	.69	.86	.00	1.59	14
Malignant neoplasms.....	.88	.94	1.03	1.00	1.29	.69	1.03	437
Diabetes.....	.87	1.03	1.26	1.15	1.00	2.05	.91	83
Diseases of the nervous system and sense organs.....	1.06	1.29	.66	1.03	.77	1.02	.96	396
Diseases of the circulatory system.....	1.09	1.03	1.15	1.09	1.02	1.21	.86	1,068
Diseases of the respiratory system.....	1.27	1.65	1.82	.77	1.56	.76	.63	52
Diseases of the digestive system.....	1.11	1.53	1.61	1.21	.89	.42	.66	103
Diseases of the genitourinary system.....	1.61	.95	.59	1.10	.85	.00	.70	41
Accidents.....	.66	1.93	1.01	1.10	1.75	.53	.78	64
Suicide.....	1.73	.00	1.22	1.56	.79	1.96	.35	16
Homicide.....	2.86	2.10	.00	.00	2.28	.00	.00	5
All other.....	.95	1.01	1.11	1.00	.83	.49	1.13	213

Table 11. Mortality ratios among white residents of Pittsburgh, Pa., by change in relative economic level, 1940 and 1950

1940 level	1950 level	Males		Females	
		1940	1950	1940	1950
Low	Low	1.16	1.12	1.15	1.04
	Middle	.86	.91	1.09	1.05
Middle	Low	1.06	1.14	.89	1.11
	Middle	.95	.98	1.08	1.06
High	High	.87	.98	.80	.97
	Middle	1.12	1.03	1.18	1.02
	High	.89	.88	.86	.91

one-third, the middle one-third, and the upper one-third, and the census tracts in which these groups lived were classified into low, middle, and high economic levels.

2. Mortality data for the 2 years were analyzed. In both instances a negative association between economic level and mortality was shown.

3. In both years, the frequency of deaths from certain causes appeared to be closely related to economic level. The causes were tuberculosis, diseases of the respiratory system, and accidents among men, and deaths from diseases of the respiratory, digestive, and genitourinary systems among women.

4. The relative differentials between the low and high groups were just as great in 1950 as in 1940 for the age groups covering the years 30 through 69.

5. In general, the census tracts which improved in relative economic level from 1940 to 1950 had a lower mortality in 1940 than those tracts whose relative economic levels remained unchanged or decreased from 1940 to 1950. This suggests an association between the 1940 mortality and the "future" relative economic level (1950) of the census tracts.

6. The 1950 mortality data were analyzed in terms of the current (1950) and past (1940) relative economic levels of the census tracts, and no association was found between the 1950 mortality and the past relative economic levels of the census tracts.

These findings point up the fact that currently in a large modern city, the well-established phenomenon of differences in mortality

among economic classes still is in evidence. Both in 1940 and 1950, mortality was highest in the census tracts with the poorer populations and lowest in the census tracts characterized by populations with higher incomes. Practically all causes of death contributed to the economic differential mortality in these 2 years and, as expected, the inverse relationship between economic level and frequency of death from tuberculosis, respiratory disease, diseases of the digestive system, and accidents was particularly noteworthy.

A new feature of the relationship between economic level of the population and mortality was revealed by the finding that in 1940 those census tracts which were to rise in relative economic level between 1940 and 1950 had a lower mortality than the census tracts of the same or higher economic level whose relative economic level was not to improve between 1940 and 1950. It would seem, then, that a favorable mortality experience preceded or went hand in hand with an improvement in the relative economic level of census tracts. In order to understand the real meaning of this concomitance and the manner in which it occurred, one needs more detailed knowledge of the factors which brought about changes in the relative economic level of the census tracts and of the changes in other characteristics which accompanied the change in economic level.

In general, economic improvement or deterioration in urban areas is reflected in improvement or deterioration of the physical environment and in shifts of population groups. Either of these factors alone or jointly could have affected the mortality of 1940. The point to emphasize, however, is that even before the improvement in the economic level of an area was demonstrated, the area experienced low mortality. Another point which emerges from this study is that the systematic analysis of vital and health statistics in a community still offers many opportunities to explore the meaning of certain factors related to ill health.

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Address inquiries to the publisher or sponsoring agency.



Safe Medicine Cabinet

The lives of many children could have been saved in 1958 by a simple household cabinet, properly used.

The National Clearinghouse for Poison Control Centers reports that during 1958 there were 1,429 deaths from accidental ingestion of poisons. More than 400 of these were in children. In 80 percent of all poisoning cases occurring in the home, according to the National Clearinghouse, the items ingested were readily accessible.

In 1958, 14,069 cases of ingestion of hazardous substances were reported to the National Clearinghouse for Poison Control Centers, established in Washington in 1957 by the Public Health Service. Of these 14,069 cases, 90 percent were in children under 5 years of age. Actually, it is estimated that 500,000 cases of household poisoning occur annually.

Most frequent causes of child poisoning are the common aspirin—baby and regular—and kerosene. One or the other from year to year heads the list of fatalities from accidental poisonings. Drugs, led

by aspirin, caused 35 percent of the fatalities in children under 5 years in 1958.

Other common causes of accidental poisonings are barbiturates, bleach, turpentine, rodenticides, potassium permanganate, pine oil disinfectants, sanitizing agents, cleaning agents, furniture polish and floor wax, and insecticides such as roach paste.

Since most childhood poisonings are a result of the failure to keep dangerous chemicals out of reach of toddlers, there have been many efforts to develop a storage chest that a child will not be able to open, but that can be opened easily by an average person old enough to know a safe item from a dangerous one. Dr. A. L. Chapman, chief, Division of Special Health Services, Public Health Service demonstrated such a prototype medicine cabinet before the Plumbing Fixture Manufacturers Association at their meeting in Washington this year.

The cabinet, which Dr. Chapman was instrumental in developing, has an ingenious locking device, difficult for a child to open, but easy for an adult.

As shown in the illustration, the cabinet has five buttons, three of which are intended simply to confuse the child. Only the second and fourth, from top or bottom, pressed simultaneously, will open the cabinet. No other combination of buttons will work—and the second and fourth are placed too far apart for a child's hand to reach both at once.

Dr. Chapman claims that since the bathroom cabinet is usually cluttered with shaving equipment, cosmetics, and medicine, in most cases medicine is the first item to be moved elsewhere. He says that a desirable medicine cabinet "should be attractive, large, accessible—one which would invite its use." He conceives that such a cabinet might be placed in the kitchen rather than the bathroom, as he believes that much home medication takes place there.

As a result of the meeting of Public Health Service personnel with the Plumbing Fixture Manufacturers Association, a Medicine Cabinet Manufacturers Council was established and an Executive Committee appointed. This committee is negotiating to develop a set of standards for manufacturing such a cabinet.

Accidental Poisoning as an Indication of High Accident Frequency

ROBERT S. McINNES, M.P.H., and DWIGHT M. BISSELL, M.D., M.S.P.H.

FOR THE PAST 2 years, the San Jose (Calif.) City Health Department has been testing the hypothesis that the occurrence of a case of accidental poisoning in a family is positively associated with a higher than average incidence of accidents of all kinds.

Study Design

The hypothesis was tested through comparison of the accident experience of two groups of people, called the poison group and the control group. The poison group was made up of families in which one child had ingested, or gave reasonable evidence of having ingested, a chemical poison and had been treated at the San Jose City-County Emergency First Aid Station. The emergency first-aid station, with a physician and nurse on duty 24 hours a day, has an established reputation for the treatment of all types of injury, especially accidental poisoning.

Families in the poison group were entered in the study approximately a week after the occurrence of a poisoning accident. These 118 families were added from time to time during the entire 17 months of the study.

The control group was selected on the basis of one criterion—the family had at least one child under 5 years of age—since childhood poisonings happen almost exclusively to

children in this age group. The 80 families in the control group were selected within a 6-week period.

Preliminary geographic analysis of the location of previous emergency first-aid station poisoning cases indicated no pattern of clustering, but rather a seemingly randomized distribution throughout the city. Therefore, a systematic sample of all households in San Jose was taken from the city directory, supplemented by a similar sample from a list of residences in areas of new construction not covered by the directory.

To ascertain the presence of at least one child under age 5, the majority of families were screened by telephone. Families without a telephone were visited by the interviewer.

The family was defined as parents and children only. Other relatives or boarders living in the household were not included in the study.

An accident was defined as an unintended injury of any degree, regardless of place of occurrence, which could be recalled by the respondent, usually the housewife, for herself and other members of her family. The following information about the accident was recorded: how it happened, where it happened, time of occurrence, type of treatment, and resulting disability, if any. After the first visit, only the question about accidents in the preceding month was repeated.

Considerable effort was made to standardize the interviews. All interviewing was done by one person, the coordinator-interviewer. Questions and the interviewer's introduction to the householder were memorized. Both poison

Mr. McInnes is a health educator and study coordinator and Dr. Bissell is health officer, San Jose City Health Department. The study received financial support from the National Institutes of Health, Public Health Service.

and control groups were approached in the same manner. The central hypothesis of the study was not mentioned, to avoid putting poison group families on the defensive.

All families were interviewed at monthly intervals. At the initial interview, each family was asked about accidents which had happened during the preceding month, the type of medical care received by children, the sex and age of each member of the family, the highest grade of school completed by adults, family income, and length of residence at the present address. Race or ethnic group of the family, type of residence, condition of dwelling unit, and neatness of housekeeping were noted by the interviewer.

Overall acceptance of the survey was good. There were no refusals to be interviewed the first time. About 1 out of 10 persons refused to be interviewed during some subsequent interview and dropped out of the study. Refusals were not grouped toward the beginning of the interviewing but were more or less evenly dis-

tributed throughout the entire 17 months of the study. In no calendar month were there more than three refusals.

As would be expected in a survey conducted over such a long period of time, a number of families were lost because of moving. Those families who moved within the city limits of San Jose, and who left a forwarding address, were continued in the study. About 25 percent of each group moved out of the study area. Some of these families had been interviewed a number of times before moving from San Jose.

Findings

This study was designed with the idea of using the occurrence of an accidental poisoning as a method of finding families with a high accident incidence so that they could be given some form of special attention, such as a nursing visit. Based on this intended use of results, small differences in rates between poison and

Table 1. Rates for three categories of accidents¹ and person-months for all accidents, January 1958-May 1959

Month of study	Accident rates per 100 persons per month						Person-months	
	All accidents		All accidents within 1 week prior to interview		Home accidents			
	Poison	Control	Poison	Control	Poison	Control	Poison	Control
1958								
January							12	
February	26.1		13.0		13.0		23	
March	18.9	22.2	12.2	18.5	18.9	18.5	74	27
April	11.5	23.7	8.3	12.2	8.3	17.2	96	354
May								
June	14.9	22.6	8.5	11.1	11.2	14.1	188	199
July	19.6	24.5	9.2	13.2	18.4	18.9	163	212
August	18.7	27.6	8.6	15.0	15.3	19.3	209	254
September	18.0	9.5	9.8	3.3	12.8	4.8	133	210
October	20.3	17.6	5.5	8.2	14.8	12.7	291	245
November	18.5	21.8	6.8	5.6	14.4	14.0	222	179
December	18.2	13.6	8.4	5.7	11.7	11.4	154	88
1959								
January	15.5	15.1	6.8	6.8	11.6	11.1	336	252
February	14.7	22.5	4.7	9.6	12.3	17.6	211	187
March	25.6	15.6	10.5	10.1	20.0	17.3	285	179
April	18.9	13.7	7.9	8.6	15.4	9.6	228	197
May	24.4	22.4	13.7	9.9	19.2	11.8	234	152
Entire period	18.8	19.7	8.4	9.6	14.7	13.8	2,859	2,735

¹ Excluding original poisoning treated at San Jose City-County Emergency First Aid Station.

control groups, even if they could be conclusively demonstrated, would have little practical importance.

Table 1 shows three types of accident rates for each of the 17 months during which interviewing was done, the rate per person per month for the entire study period, and the number of person-months for all accidents for both poison and control groups. Because the poison group was chosen on the basis of the occurrence of an accident, this accident was omitted from the tabulation.

In order to test the likelihood of chance variation in the rate for all accidents for the total study period, for both poison and control groups, a test for confidence intervals was used with the monthly rate distribution. For the control group this test indicated that if every household in San Jose with a child under 5 years of age had been interviewed, there are 19 chances out of 20 that the mean rate for the entire group would have been between 16.8 and 22.2 per 100 person-months. Since the poison group was not a sample, such a test was inappropriate. However, should one assume that the time period of our study represents a random sample of the indefinite future, such a test would give us the likelihood 19 times out of 20 that the future poison mean rate would be between 16.8 and 21.0 per 100 person-months. Assuming that the means for the two groups are at opposite ends of the confidence intervals

(poison 21.0 and control 16.8, an unlikely assumption), the rate differences between the two groups would not seem to be large enough to warrant special attention for the poison group as a whole.

Analysis of the poison and control groups revealed slight differences on certain variables, such as age distribution, income distribution, and education. To see how these differences in population characteristics would affect accident rates, a standardized population technique was used. The effect of using such a technique with various differences in the two groups is shown in table 2.

This technique involved taking a specific rate for the poison group, age for example, and multiplying these rates by the actual proportionate distribution for this variable in the control group. This multiplication gave us a hypothetical number of accidents which would have occurred had the poison group had the same proportionate distribution as the control group for the variable under consideration. With this hypothetical accident total it was possible to produce a single accident rate which would be comparable to the observed rate for the control group. The age-adjusted rate is obtained by multiplying the poison rate by the control person-months for each age group and dividing the sum of the results by the sum of the control person-months.

Adjustment for differences in distribution of

Table 2. Effect of applying various poison group rates to control group distribution

	Accident rates per 100 persons per month		
	Poison group		Control group rate (actual)
	Actual	Adjusted	
Assume:			
Adjusted age distribution for—			
All accidents.....	18.8	17.9	19.7
Accidents within 1 week of interview.....	8.4	8.2	9.6
Home accidents.....	14.7	13.5	13.8
For all accidents—			
Same number interviews completed.....	18.8	18.1	19.7
Same distribution of—			
School grade completed by mother.....	18.8	18.8	19.7
Income.....	18.8	18.5	19.7
Rented and owned dwellings.....	18.8	17.8	19.7
Length of time resident at current address.....	18.8	17.6	19.7
Condition of dwelling units.....	18.8	18.6	19.7
Housekeeping neatness.....	18.8	18.0	19.7

population characteristics consistently reduced the poison accident rate, further detracting from accepting the hypothesis of increased accident incidence for the poison group. There was little difference in distribution of other variables, not shown in table 2, between the poison and control groups.

An analysis of accidents reported by each group on the basis of type of treatment and place of accident shows little difference between the two groups (tables 3 and 4). In order to discover whether or not similarities in gross overall rates were simply masking different individual accident liabilities, we analyzed the number of accidents which were reported during the first six interviews for individuals who were in the study for six interviews or more. The distribution of these accidents in the poison and control groups is practically identical.

Some family injury surveys, in which the

same families were interviewed over a period of time, showed a noticeable decline in their reporting of accidents. Whether this is due to an actual decline in the number of accidents, or to a decrease of interest in the study, has not been determined. Nevertheless, we were concerned with this question. In the poison group, individuals had fewer interviews than in the control group. To test the effect of fewer interviews on the accident rate, we used the adjusting technique mentioned above. The results are shown in table 2, which shows what would have happened had the poison group been selected and retained in the study in the same manner as the control group.

Another item with which we were concerned was the ability of the individual to recall accidents. While the interviewer asked about all accidents that had occurred to the family within the past month, accidents were coded separately according to those which had occurred within a week prior to the interview and those which had occurred in the remainder of the month. Of the total accidents reported, 46.6 percent were reported as occurring within a week prior to the interview, 50.2 percent within the rest of the month, and 3.2 percent were reported as date unknown. Logically, one would expect three times as many accidents to be reported in the first 3 weeks of the interview month as in the week prior to the actual interview. However, the tabulation of accidents reported within 1 week prior to the date of interview, does show a distribution similar to that found for all accidents (table 1).

Table 3. Percentage distribution of all accidents,¹ by type of treatment

Type of treatment	Group	
	Poison	Control
None.....	26.3	24.8
First aid.....	62.4	64.1
Medical attendance.....	6.3	6.9
City-County Emergency First Aid Station.....	3.0	1.3
Hospital outpatient department.....	1.5	2.2
Hospital inpatient department.....	.2	.2
Not stated.....	.4	.5

¹ Excluding original poisoning treated at San Jose City-County Emergency First Aid Station.

Table 4. Percentage distribution of all accidents,¹ by place of occurrence

Place of occurrence	Group	
	Poison	Control
Own home.....	69.0	60.7
Other home.....	9.1	9.3
Work.....	4.4	5.5
School.....	3.9	3.1
Motor Vehicle.....	1.7	1.1
Public place.....	8.7	18.5
Not stated.....	3.2	1.7

¹ Excluding original poisoning treated at San Jose City-County First Aid Station.

Accident Morbidity Data

In testing the hypothesis that accidental poisoning may be associated with a higher than average incidence of accidents, the study uncovered accident morbidity data which are similar to the findings of other accident studies. The distribution of accidents by age group is given in table 5. The distribution of home accidents shows a pronounced age-specific rate differential. The higher accident rates are associated with the younger age groups (table 5). While the home accident rates for both poison and control groups were nearly identical for most ages, in the poison group slightly higher

rates were noted for age groups 1-2 years and 3-4 years.

Figures are available showing the location of greatest accident liability in the home. Excluding the original poisoning, for males in both poison and control groups the largest number of accidents occurred in the yard, with 22.2 percent of accidents in the poison group and 18.0 percent of those in the control group occurring there. For females in both groups, the kitchen was the most dangerous place; 22.3 percent of accidents in the poison group and 23.7 percent of those in the control group occurred in the kitchen.

As to the hour of the day of greatest accident liability, we see a peak from 10:00 a.m. to 12:00 noon, and another peak from 2:00 p.m. through 6:00 p.m. Accidents reported between these hours were coded to the nearest hour.

The degree of correlation of all accidents for poison and control groups, by month, was tested. The correlation was almost zero, indicating that seasonal variation, if it exists, is lost in random movement of the rates up and down by month.

During the course of the study, nine individuals in the poison group had a second accidental poisoning. Only one of these came to medical attention, being treated at the emergency first-aid station. Checking the cards of the nine individuals who had repeated poisoning against various poison group statistics

revealed no leads which would have helped to predict this recurrence. One control group family did have a case of accidental poisoning which was treated at the emergency first-aid station, and this family was transferred to the poison group. In the control group there were six additional cases of accidental poisoning which received no medical attention. Checking the six cases against various control group statistics revealed no leads which would help us to separate this group from the entire control group.

Considering the relatively low incidence of accidental poisoning, the fact of repetition of such an accident to the same individual in 9 cases out of 118 may be a major finding. However, this finding should be interpreted with caution. Let us assume that accidental poisoning of any form is randomly distributed and that the occurrence of one incident to a child does not influence the likelihood of the same child experiencing a subsequent poisoning. From these two assumptions, we would expect to have the same number of accidental poisonings per month per person in the susceptible age group in both the poison and control groups. Remember that we are assuming that the occurrence of the initial poisoning does not affect the likelihood of a subsequent poisoning. There are about 50 percent more person-months in the susceptible age group in the poison group than in the control group; thus we see that the

Table 5. Rates for all accidents¹ and for home accidents, and person-months for all accidents, by age group

Age group (years)	Rates per 100 persons per month				Person-months	
	All accidents		Home accidents		Poison	Control
	Poison	Control	Poison	Control		
Under 1.....	16.9	28.7	16.4	24.8	213	129
1-2.....	35.5	32.1	31.4	26.1	612	433
3-4.....	22.8	20.4	18.5	14.4	319	416
5-9.....	16.4	17.4	8.7	8.2	312	414
10-14.....	14.1	16.0	8.3	6.9	121	175
15-24.....	14.1	21.3	8.9	14.9	348	249
25-44.....	10.3	13.6	7.2	9.6	920	877
45-64.....		16.7		14.3	10	42
Not stated.....					4	
All ages.....	18.8	19.7	14.7	13.8	2,859	2,735

¹ Excluding original poisoning treated at San Jose City-County Emergency First Aid Station.

nine cases in the poison group and the six cases in the control group actually represent an identical rate. While the assumptions stated above may be questioned, if they were true, the "repetition" of accidental poisoning observed would be exactly what we would expect on the basis of chance alone.

Discussion

Data gathered by this study about the nature of accidents were somewhat limited since the study included only families with a child under 5 years of age. The study was designed with the intent of providing a test of the possibility of using the fact of poisoning as a technique for finding families with a high incidence of accidents.

Results do not seem to favor using accidental poisoning as an indication that a family is subject to a high incidence of accidents of all kinds. We gathered no systematic evidence to indicate that a poisoning accident made the family more aware of safety and more receptive to information on safety. Furthermore, we did not get information as to the level of potential hazard of various toxic materials, nor as to their storage.

Genesis of an Accident

In the July issue of *Public Health Reports*, Dr. Albert L. Chapman, Assistant Surgeon General, Public Health Service, discussing "The Anatomy of an Accident," described how a series of unsafe acts led to an injury caused by a flower pot falling from a window. While his text was in the hands of the printer, an accident remarkably similar to the hypothetical accident outlined by Dr. Chapman was reported by the Associated Press, as shown here in a clipping from the *Washington Post*. The tragic event gave substance to Dr. Chapman's conviction that unsafe acts in themselves are the important target in accident prevention campaigns.

Summary

The San Jose (Calif.) City Health Department tested the feasibility of using the occurrence of a case of accidental poisoning treated at an emergency facility as an indicator of a family with a high incidence of accidents. However, such families experienced no more accidents than the average of similar families, except for a slightly higher rate for home accidents in the poison group for ages 1-2 years and 3-4 years.

The accident experiences of 118 poison group families and 80 control group families were obtained by means of periodic household interviews. Poison group families were chosen on the basis of having a child under 5 years of age who had been treated for poisoning at the San Jose Emergency First Aid Station. Control families were made up of a systematic sample of all families in San Jose who had one child under 5 years of age. Comparison of the accident rates for the poison and control groups revealed no major differences. Accidental poisoning cases treated at an emergency facility do not seem to be a means of casefinding for families with a high incidence of accidents.

Any Negligence Ruled Out in Dumbbell Death

NEW YORK, July 7 (AP) — The District Attorney's office today ruled out any criminal negligence in the death of Detroit businessman Alvin Rodecker, struck on the head by a dumbbell two weeks ago.

The dumbbell was being used to prop a screen in the eighth-floor apartment of television entertainer Arlene Francis and her husband, theatrical producer Martin Gabel, at the Ritz Towers.

It was accidentally dislodged by a maid and struck Rodecker as he strolled with his wife at Park ave. and 57th st. He died the next day, June 24.

An Approach to Metropolitanism

MALCOLM C. HOPE, Ch.E., M.P.H., and B. COWLES MALLORY, B.S., M.G.A.

UNIQUE and staggering problems confront the public health engineer looking at a modern metropolis. Some stem from rapid population growth, others from the maze of local governments. They are unique because the engineer has the technical knowledge necessary to solve them but not the means of applying his ability. They are staggering by the sheer force of the number of people affected.

The large metropolitan areas are a fact of life today that is not likely to be wished away. Every indication points to the continued concentration of people, production, and services in and around the large cities. The large "metros" will grow even larger until, for example, there may be one continuous built-up area extending from Portland, Maine, to Richmond, Va., and another stretching across the entire industrial belt of the Midwest. Even today a traveler sees few open areas in these regions.

Everyone has his own method of showing this growth. The fact that, in this decade, 85 percent of the country's population growth has taken place in the "metros" with the suburbs growing six times as fast as the central city, is the point we emphasize.

To fully appreciate the health officials' dilemma, it is necessary to understand the setting. Housing developments cut across borderlines of traditional governments and flow out into unincorporated areas to produce a governmental maze that almost defies description, let alone solution. In 1957, an average of 90 local gov-

ernmental units existed in each "metro." Since 1952, 170 new municipalities and 519 new special district governments have been created within the 174 largest "metros."

No universal governmental pattern applicable to all areas has been developed and none appears likely. Curiously enough this is the only point on which there seems to be universal agreement among political, governmental, and administrative specialists. There seems to be no characteristic difference in organization or situation between the successful and unsuccessful. Special districts are often endorsed by groups interested in only one governmental function. Political scientists, however, criticize them as creating another level of local government, a pattern already complex with the relationship of citizens to government uncertain and often irritating. Annexation, incorporation, federalization, functional transfer, all have been tried. All have had successes and failures. A study by the Government Affairs Foundation indicates that each metropolitan area faces similar problems, but a wide variety of solutions are suggested.

Where does this leave the sanitary engineer? What does he face while the politicians battle over forms of government? In one case, he must deal with a 5-year old subdivision of \$30,000 homes where 60 percent of the septic tanks are failing. In another area, he is faced with a citizenry that will fight a proposed sewer system in order to maintain local autonomy. Air pollution may refuse to hover over the community that produces it. He may supervise a water system that will be inadequate next year or a subdivision with individual wells and septic tanks on small lots. Or present landfill capacity is being depleted while homes are being built over possible future disposal sites. These

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problems and more like them are familiar to any local environmental health official.

What can the health officials do? Is the problem too complex to solve? The solution is not yet known but we have a good approach through community planning. Planning is a well-established process, seeking to promote a better environment. By working with planners, health officials can make substantial progress.

There are no "pat" answers to urban sprawl. There are, however, certain steps which tend to help. These follow the standard pattern of scientific approach, find the facts, evaluate the facts, determine needs, and seek solutions. They help by virtue of promoting orderly community growth. It cannot be said that they will insure satisfactory results, but there is a great deal of evidence that without them there is much less chance of success. Working to promote this procedure by development of comprehensive sound plans for community action appears to be the most promising approach.

But the use of this process by local officials is not as easy as it sounds. It has been demonstrated repeatedly that health officials know more than they are able to apply. The solution to environmental health lies in a context of sociological and political factors. As always in the political scene, human motivation, politics, governmental structures, group dynamics, and leadership play dominant roles. The most carefully engineered and logical solutions often fail when subjected to the political process.

The philosophy that must be used is the essence of the planning process, the collection and analysis of facts and the projection of these facts into the future. Progress is made by having the health facts available as guides for shaping legislative decisions. Even a good plan often fails, but a poor plan or no plan at all isn't even a good try.

The best technique to accomplish this progress is well known to city planners. It is, simply, the development of comprehensive, sound plans for use in guiding community action. Such plans will seldom be carried out without changes and even reverses, but given enough support and considered as a goal, they very likely will be approached ultimately. The at-

tainment of sharply defined objectives, even though modified during the process of achievement, promise greater chance of success than the chaos and confusion inherent in promoting ill-defined, nebulous goals. To one accustomed to expecting clear-cut decisions and actions, this interplay of human failure to accept a professionally sound plan is discouraging. Yet, it is a fact, and one which must be recognized.

Health and Planning

Environmental health is strategic to the work of a city planner for one basic reason, the need to make the community a healthy (healthful) place in which to raise a family and make a living. Health precedes all other needs, such as transportation, schools, and industrial activity. And a public health official should remember his importance in planning a community's growth.

In actual fact, health reasons have had a limited although very beneficial effect on community planning. In studies of 11 "metros" conducted by the General Engineering Branch of the Public Health Service, outstanding environmental health programs were observed, and community planning was an impressive factor in achieving these positive results. Seven of the 11 counties studied had either local or county planning agencies. The cooperation between them and the health departments ranged from nonexistence to a day-to-day working relationship between professional staffs. A definite relationship was observed between the degree of cooperation of health and planning officials and the level of environmental health services. Four counties with superior cooperation had, in general, better health services than three where little cooperation was found. Personal participation by the health official in planning was essential to their effective development and application.

It is more significant that counties giving consideration to environmental health factors in planning were in a superior position in overcoming or preventing future problems. The four counties making no plans were in no position to cope satisfactorily with the health aspects of population growth.

The 1958 National Health Forum had as its

Discussion

I heartily endorse close working relations between health agencies and professional planning groups at the city, the metropolitan, the State, and the regional areas.

However, further consideration should be given to using the drainage area as a basis for managing water supply and waste disposal. The gravitational flow of water never respects political boundaries. Moreover, the direction of flow cannot be altered with as little expense as a political boundary.

In the introduction, the authors led the reader into a concept of large "metros" of a corridor character cutting across wide geographic areas. But in the body of the paper, the actual practical relations with planners imply a city of more or less narrow metropolitan approach.

More consideration to State or regional planning might make it possible to develop a drainage basin system through close working relations with water resource commissions and conservation departments.

The authors have not only stimulated thought but have indicated avenues of approach. It is indeed encouraging to see the health agencies take the initiative in working at all levels of community planning. It is only through such effort that we shall provide modern urban technological society with an environment in which people can thrive and not merely survive.—C. J. VELZ, *chairman, department of environmental health, the University of Michigan School of Public Health, Ann Arbor.*

theme "Urban Sprawl and Health." Its purpose as stated in the preface to the final report on the conference was to "emphasize the need for, and demonstrate a pattern of, understanding and cooperation between planning and health toward the goal of healthier people in healthier cities, suburbs, and related areas."

Community Planning

What exactly is this community planning we are promoting? It is not a mysterious process understood only by experts, nor a substitute for the democratic process. It is not detailed design; it is simply a guide for future com-

munity development. All the factors affecting growth and community aspirations are considered. These facts are collected, analyzed, and used as a guide for making legislative decisions that in turn shape the future environment. Planning is less a policymaking function than a professional task. A local council pays good money for professional advice. Although the council may not follow their suggestions, the planners' influence is usually felt. Even if a plan is not fully adopted, the planning process is important in both molding and influencing community thought. And often the mere existence of a planning body causes the community to think more seriously about its future.

Usually, the local legislative body is responsible for appointing a planning board or commission. Very often such a planning board is completely independent of the executive branch of the local government, but in some places the board is a part of a department within the executive branch. There is little evidence to indicate that any one form of administrative arrangement is better than another. In a larger community, usually the board employs its own staff; in smaller cities, it often relies on a private consultant. Most staffs or consultants are highly technical people, while boards or commissions are composed of laymen.

The planners use four major tools to guide the growth of a community: master plans, capital budget, zoning, and subdivision regulations. In the fields of master planning, zoning, and capital budgeting, the planners act only as advisers to the council, with some communities requiring the council to refer certain matters to the planners for recommendations. Very rarely is the council required, however, to follow their advice. But in subdivision regulations, the planning board or commission may have limited legislative power. For example, in a typical case an extraordinary majority of the council would be required to override the planning board's recommendations, but only a simple majority could endorse them.

Master plan. The most important planning tool in setting forth all the facts influencing the community's development and serving as a guide for future growth is the so-called master plan. Presented on a map of future

land use, this master plan encompasses the total problem; transportation, communications, schools, recreation, utilities, appearance, industry, economic base, sewers, water, residential and commercial areas, and many other considerations are all a part. In addition, it attempts to find the interrelationships among all these. In most cases, the plan has no legal status, since it is rarely enacted into law. Frequently the local council votes an informal approval, however.

Health should be considered carefully in developing a master plan. The consideration given to the importance of health needs in the planning stage may determine the actions of the local legislative body when it weighs needs of the whole community in the future environment.

Capital budget. A capital budget is developed from an analysis of the community's financial resources and prospects. A priority schedule of site acquisitions and expenditures for large-scale physical improvements, such as buildings, streets, and utilities, is presented as the counterpart or complement of the master plan. Such a capital budget is not enacted as an ordinance or law by the council but is used as a guide in preparing the annual budget to apportion the financial burden over a period of several years.

Sewage treatment plants, landfill sites, and similar environmental health facilities must compete for funds with other community requirements. A capital budget is an excellent way to get a higher priority for health facilities if health officials make the facts known to the planners. The facts are usually convincing. The dividends from the majority of investments in environmental health are much greater than an equal investment in other facilities.

A good capital budget, like a good master plan, is characterized by its projection into the future, its flexibility, and the interrelationship of its parts; it is subject to continual study and revision.

Zoning: The third major tool of planners is zoning. Facts prepared by the planners for an immediate single legislative decision are often given in detail for council consideration. A zoning map will be included, together with the regulations for various zones.

Advances for Public Works Planning

The Community Facilities Administration of the Housing and Home Finance Agency reports that since the beginning of its program of advances for public works planning through March 31, 1960, 2,341 applications totaling requests for \$74.9 million have been received. The agency approved 1,346 for \$31.3 million. Of the applications received, 53 percent have been for sewer and water projects, about 2 percent for hospitals and other health facilities, and the remaining 45 percent for educational facilities, public buildings, streets, bridges, and other miscellaneous public facilities.

The program of advances for public works planning was established by the Housing Act of 1954 and its amendments in 1955. Under this legislation, funds may be advanced to States, municipalities, and other public agencies to help finance the cost of the planning of needed public works. These advances are repaid, without interest, when construction is started or when contracts are awarded.

The purpose of the program is to encourage municipalities and other public agencies to maintain at all times a current and adequate reserve of planned public works which can readily be placed under construction, and help attain maximum economy and efficiency in the planning and construction of public works.

Zoning utilizes the police power of the local government to regulate land use, and, therefore, is actually enacted into law by the council. Among other things, a zoning ordinance delineates residential, commercial, and industrial zones; establishes lot sizes; regulates building height and setback; and establishes performance standards. These requirements govern the population density which in turn affects sewer sizing, the quantity of solid wastes, and the water consumption of an area.

A good zoning ordinance is an extension of the master plan, but need not necessarily follow it in every respect. Zoning has certain short-term aspects relative to land use, while the master plan is a long-term land use projection.

Subdivision regulations. Subdivision regulations are the laws governing the division of

land parcels for sale as separate lots. In contrast to zoning which is based on the police power, subdivision regulations are enforced by the power to withhold the privilege of public record. If a plot is not recorded, it can be sold only by metes and bounds, that is the length and bearing of the boundary lines. It is difficult to sell land in this manner because of the lack of adequate control to enforce the regulations. Often a community will make it even more difficult to use metes and bounds by making it illegal to refer to an unrecorded plot. It is much easier to sell land by block and lot numbers. In return for this privilege of public record, the community requires conformance with certain standards. These standards may cover the layout, grading and surfacing of streets, length of blocks, area and location of open water supply, connection to public sewers, storm drainage, or conformity to adjacent plots.

Subdivision regulations can be used to control the installation of on-lot sewage disposal systems and on-lot water supplies. These are health factors which can be taken into consideration if a health department reviews the plots before they are recorded. To be most effective, the law should require that health department approval of such on-lot installations be mandatory rather than simply advisory.

Health Department Action

Master plans, capital budgets, zoning, and subdivision regulations, the four tools of planning, are the main phases of the community planning process, and each has a direct effect on environmental health. The question then arises, how can the health official become a part of this planning process? Since community planning is principally the work of professionals, the best method is to work with the planners.

A planner, like a health official, is a specialist. His motivation, or dedication if you will, is much the same as that of environmental health officials. He wants a comfortable income, but his rewards are found just as much in accomplishments from his work as from monetary return. Like the health official, he is working for a better environment.

Observations in the 11-county survey revealed that an effective health official made it a point to get to know the local professional planners in his community, to learn what they do, how they think, and what they are trying to accomplish. He took pains to find out how much influence the planners have and whom they influence. It surprised many an "old hand" in the community to find out how effective planners could be.

To ascertain what the planners were doing, the health officer studied the planners' maps and charts and read their publications. He attended their board meetings to see what things are considered and how much they have to do with health. Conversely, he let the planners know what environmental health officials do, the problems they face, and the goals they seek.

A great deal of benefit came from exploring common problems and approaches. Both the health official and the planner were working toward the same ends and against the same obstructions. Each realized that he could and should help the other. The planner needed the facts that only the health official could supply.

The most important factor observed was the value of maintaining a close working relationship between the professional personnel of the two disciplines. The small day-to-day contacts and exchanges of information produce big results in the long run.

In essence an effective health official convinces the planners that public health engineers are not just technicians but are full-fledged professionals with the vision and imagination to see into the future.

Summary

Over the years, health activities have progressed from a concern with disease alone to a broader concern with health and now are expanding to include planning for future health services as well. Although little used at present, community planning has been a very useful tool for the environmental health official in carrying out this expanded concept of public health. Tomorrow's environmental health problems can often be prevented by health department participation in the community planning process today.

Federal Publications

Treating Cancer. *PHS Publication No. 690; 1960; 16 pages; 15 cents.*

Modern uses of medically approved treatments in saving a growing proportion of cancer patients are described in terms understandable to the layman.

The purposes of cancer surgery and the improvements and research in this field are discussed. A section on radiation defines X-ray and radioisotopes and tells how radiation is used to treat cancer. Hormones, cell poisons, metabolic antagonists, and antibiotics are covered in the section on chemotherapy.

Seven books and pamphlets and 14 articles are listed in the recommended reading.

Dietary Aspects of Cardiovascular Diseases. Selected references. *PHS Publication No. 755; 1960; 24 pages.*

Designed for public and voluntary health workers, this annotated list of research papers, pamphlets, books, and teaching aids covers the dietary aspects of cardiovascular diseases.

The material is organized into five major areas: general information; calorie restriction—obesity and weight control; sodium restriction—congestive heart failure and hypertension; fat control—atherosclerosis and coronary artery disease; and food composition tables.

A flip chart format (8½ inches by 11 inches) is used to separate and identify each of the major categories.

Directory of Local Health Units. *PHS Publication No. 118; revised 1960; 80 pages; 30 cents.*

Local health units of each State are listed alphabetically according to classification of the unit. Included are the name of the health officer or administrative head and the city in which the headquarters is located.

The appendix contains tables showing the number of units and counties covered; the number of units without medical, nursing, or

sanitation personnel; and the units with a vacancy in the position of health officer or administrative head.

Health Statistics From the U.S. National Health Survey. Types of injuries, incidence, and associated disability, United States, July 1958–June 1959. *PHS Publication No. 584-B16; 1960; 36 pages; 30 cents.*

Estimates of the number of injuries and days of disability, by class of accident, sex and age of the victim, and type of injury are presented. Injuries are classified as fractures and dislocations, sprains and strains, head injuries, lacerations and abrasions, contusions, burns, poisonings, effects of weather and exposure, and complications of therapeutic procedures.

Included are 15 detailed tables, a population table, the questionnaire on which the statistics were collected, and appendixes containing definitions and technical notes on methods.

Health Statistics From the U.S. National Health Survey. Peptic ulcers reported in interviews, United States, July 1957–June 1959. *PHS Publication No. 584-B17; 1960; 26 pages; 25 cents.*

Detailed tables, text tables, and charts give estimates on prevalence of peptic ulcers, according to medical attention status and by age and sex of the patient.

Associated disability is shown by days of restricted activity, days of confinement to bed, and days lost from work.

Appendixes contain technical notes on methods, definitions, and the questionnaire on which the data were collected.

Health Statistics From the U.S. National Health Survey. The Hawaii health survey, description and selected results, Oahu, Hawaii, October 1958–September 1959. *PHS Publication No. 584-C3; 1960; 54 pages; 40 cents.*

The design, content, and preliminary findings of the health interview

survey conducted cooperatively by the Hawaii State Department of Health, the Oahu Health Council, and the National Health Survey are presented.

Twenty tables and numerous charts show selected survey results. Appendixes contain notes on sampling errors, definitions, a list of the contributors to the project, and a reproduction of the questionnaire on which the data were collected.

Strike Back at Arthritis. *PHS Publication No. 747; 1960; 45 pages; 40 cents.*

Therapeutic procedures that can be carried out in the home by the patient and his family are described.

Designed to aid physicians in prescribing treatment for arthritis patients and instructing them in proper care, the manual gives step-by-step instructions for 15 exercises which will preserve or improve the range of motion of the involved joints. Each exercise appears in duplicate on facing pages. The page labeled "ACTIVE" shows how the patient can do the exercise by himself. The page labeled "ASSISTED" shows how someone can help the patient do the same exercise.

Other sections deal with the importance of good posture, the use of heat, splinting, canes and crutches, and self-help devices.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D.C.

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